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# COLLECTIVE REVIEW

## ATRESIAS OF THE GASTROINTESTINAL TRACT

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THIS introductory article is a review of the original case histories and other important data of 1,498 cases of intestinal atresia reported in 1,353 articles, theses, and textbook discussions on this subject. This is part of the material already located and compiled by the writer in the correlation and study of the accumulated knowledge concerning the etiology, diagnosis, and treatment of the anomalies and diseases causing the "acute surgical condition of the abdomen" in the newborn and infant. The study comprises over 4,100 original articles appearing in 19 different languages including Japanese and Russian. The foreign articles were translated for the writer by the Department of Literary Research of the American College of Surgeons and the New York Academy of Medicine. Each article was personally studied; important information was recorded on data cards and crossfiled for future reference.

This review will deal with the voluminous literature, including the many students' theses, written on atresias of the gastrointestinal tract. The first cases reported and the 139 cases (in all age groups) successfully treated and reported will be listed and discussed. Possible reasons for the apparent increase in the incidence of intestinal atresia will be stated and explained. The writer will also try to show that the commonly accepted etiology—the persistence of physiological epithelial occlusion of the intestinal canal—is not acceptable in the majority, if any, of the cases. The importance of early diagnosis and supportive care during the observation period in the newborn or older infant with symptoms suggestive of intestinal obstruction is stressed and explained. An opinion is given concerning the real need for a better term to denote and describe the partially occluded bowel resulting from an early-acquired intrauterine malformation of the fetal intestine.

The pathological study with a classification of the various types of atresia, a detailed report of the successfully treated cases, and the methods devised to treat these cases will be found in articles recently submitted by the writer for publication.

The terms "gastrointestinal atresia" and "intestinal atresia," when used literally in this article, refer to a subtotal or total atresia of the gastrointestinal tract, excluding the esophageal and rectoanal regions.

### THE LITERATURE

An atresia of the intestine, especially the total atresia with intestinal obstruction in the newborn, was an intriguing and often recorded finding of the very early medical writer. In 1812 Meckel was probably the first to review the literature, list the recorded cases, and discuss the etiology and pathology of the condition. Schaefer, in 1826, again brought the subject up to date; he was the first to classify the various types. One of the most important theses on this subject—and the one most often quoted—was written by H. Hirschsprung of Copenhagen in 1861. The only known copy of this work was located in the library at Uppsala University, Uppsala, Sweden[1]. In 1877

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[1]A microfilm copy of this thesis, and microfilm or photostat copies of other rare articles have been placed in the Library of the American College of Surgeons.

Theremin published one of the most classical articles on this subject. Working with his predecessor, Rauchfus, at the St. Petersburg Home for Foundlings, Theremin carried out the first planned study of atresias of the intestine; autopsies were made and anatomical specimens taken from all children who died in this institution. In 1902 Braun reviewed the literature and reported on the surgical treatment; he was impressed with the inability to save any of these patients surgically. He realized that enterostomy alone was impractical and rejected primary resection and anastomosis after noting that no patient had been treated successfully. He suggested that in the future these babies be operated upon soon after birth, by the then little-known method of "staged" resection and anastomosis of the intestine. In London in 1912 Spriggs wrote the most exhaustive article ever to be written on the subject. He presented in detail 328 cases, including 24 new cases collected from the London hospitals and medical museums. The subject was discussed in detail with a list of each type of atresia, a summary of all the operations performed, and an exhaustive bibliography. It is unfortunate that this author, whose work is so frequently used and quoted, relied on many review and abstract articles. A study of the original case histories reveals that in many cases the type and position of the atresia or atresias were incorrectly listed, while about 10 per cent of the 328 cases were not true atresias and should never have been included in his series.

The best of the more recent articles was written by Webb and Wangensteen in 1931. These authors added 2 personally observed cases and 15 other unreported cases from the records of the department of pathology of the University of Minnesota to the 500 or more cases mentioned in the literature.

The first case recorded in the literature, insofar as the writer has been able to determine, was that of the 1½ day old infant with a total atresia of the colon reported by Binninger in 1673. Then came the female stillborn monstrosity with a total atresia of the terminal ileum originally reported by Goeller in 1684. This case was one of triplets; the other two triplets—also females—were normal and lived. The third case was reported by Horch in 1696, that of a female infant who lived 22 days with an atresia in the lower ileum with separation of the bowel. These and other earlier cases were listed by Meckel in an article in 1812, with the original references given in footnotes.

Part of the literature is very confusing; many articles are poorly titled and cases often are reported incorrectly or listed improperly. Some cases, including a few of those successfully treated, have been reported two or more times by the same or different authors. Several examples are: Abel's successful gastroenterostomy in 1899 for familial hypertrophic pyloric stenosis in an 8 week old boy is still occasionally listed as a successfully treated case of duodenal atresia; the preoperative diagnosis was atresia of the duodenum. The duodenal atresia successfully treated by Weeks in 1916 and reported by Porter and Carter in 1922 was again reported by Weeks and Delprat in 1927; the pediatrician, R. Langley Porter, referred the case to the surgeon, Alanson Weeks, who operated upon the 6 day old male infant. The case of the newborn with an atresia of the ileum successfully treated by Carter in 1930 and reported by him in 1933 was again reported in detail by Reisman in 1937. In recent summaries these 2 cases have been listed as 4 successfully treated patients with intestinal atresia. Data for the 14 cases reported from the Children's Hospital in St. Louis have to be obtained from different sources: Malvern B. Clopton reported in 1928 the first series of cases; in 1931 and 1933 Warren H. Cole reported all the then recorded cases in this hospital. It may be impossible to list correctly and classify the cases reported from the Boston area. Ladd and Gross in their monograph "Abdominal Surgery in Infancy and Childhood" (1941) list all the cases in which treatment had been given at the Children's Hospital in Boston. Many of these cases also have been reported by others writing from this area; Quinland (1922), Loitman (1927), Thorndike (1927), Baty (1929), Ladd (1930, 1933, 1937), Neuhauser (1944), and Williams (1946) have reported one or a series of these cases.

Even in recent articles, those reporting cases of intestinal atresia will often begin with such titles as "congenital atresia," "intrinsic atresia," "congenital microcolon," or "congenital intestinal stenosis." Many of these terms are incorrect and when used are misleading. The collapsed intestine below a total atresia has never received meconium and, therefore, it has never functioned normally. Yet this bowel is anatomically and physiologically normal; its fleshy color and wormlike appearance are the results of nonactivity and are not due to maldevelopment or atrophy. The term "stenosis" when used in describing the state of an intestinal segment, simply denotes a narrowing or lessening of the lumen of the bowel. This could be produced in many ways either before or after birth. The term "congenital" denotes only that some disease or abnormality in the newly born infant occurred during intrauterine development and was present at birth.

The term "atresia"[1] when used in this article, implies a partial or complete closure of the lumen of the intestine due to an abnormally developed bowel wall, the accident or error in development having occurred during the first few months of fetal life. The terms "total or complete atresia" and "subtotal or partial atresia" are used to denote and define the degree of this malformation. The use of these terms would eliminate the unnecessary confusion and simplify the future recording and study of the literature on this subject. The types of atresias can be described simply and accurately with the terms "tubular," "perforated septum" (diaphragm or membrane), and "annular" for the subtotal or partial atresias; and "cord-like," "septum" (diaphragm or membrane), and "with interruption of the bowel wall with or without a V-shaped gap in the mesentery" for the total or complete atresias.

Glover and Barry apparently appreciate also the need for a better term to denote and describe a subtotal atresia. In their article, "Intestinal Obstruction in the Newborn," read before the American Surgical Association, in St. Louis, Missouri, on April 21, 1949, they used such terms as "incomplete", "complete", and "intrinsic" stenoses to describe these atresic lesions. After reviewing their 26 cases of "intrinsic obstruction" they stated: "In this report we have not attempted to separate the intestinal atresias from the stenoses, since the classification is difficult at best, and the only functional difference between the two is in the relative degree of obstruction produced."

## INCIDENCE

Reports in the literature still give the incidence of intestinal atresia as about 1 in every 20,000 to 40,000 births. This intestinal malformation or accident occurs with a much greater frequency than is realized; it is less considered and more unheeded, than uncommon. On the other hand, the imperforate anus and low rectal atresia continue to be found about once in every 8,000 births. This is because an anorectal examination is always made at birth and an abnormality here is looked for and recognized by even the community midwife.

The frequency of intestinal atresia has been determined in most cases from the statistical data of general hospitals, children's hospitals, and foundling homes. Here the frequency, compared with the admissions, normally would be very low; the majority of children in these institutions would be from 2 to 12 years of age. This error is understandable when we consider that more than 83 per cent of the cases of intestinal atresia reported were infants under 2 weeks of age, that until the last few decades most of the babies throughout the world have (as shown in Dublin and Fishbein's statistical reports) been born in the home, and that as recently as 12 years ago only 37 per cent of the children born in the United States (the statistics show that they were among the world's healthiest) were born in hospitals.

Too often we have failed to consider the possibility of an intestinal obstruction in the newborn, or we have waited until it was too late to treat the condition safely. We also have been handicapped by not knowing why many of these babies died. The autopsy of a newborn is not required legally, and with too few exceptions is unpopular and not requested by either the physician or the parents.

In 1909 Stillman could find only 13 proved cases of congenital hypertrophic pyloric stenosis among the births reported or recorded in the Pacific Coast states, although we know this condition occurs in the Anglo Saxon countries (where vital statistics are more accurate) about once in every 250 to 500 live infants. Haight recently reported 8 cases of esophageal atresia among 17,568 consecutive newborn infants. This anomaly, considered extremely rare by many, here showed an incidence of 1 in 2,196 newborn infants in this surgeon's locale.

The number of reported cases of an anomaly or disease invariably will increase following safer and more accurate methods of diagnosis and treatment. The present increased interest and better results in newborn and infant abdominal surgery (due in part to a closer relationship between the obstetrician, pediatrician, and surgeon) should show a rapid increase in the number of infants with an acute intestinal obstruction whose condition is correctly diagnosed, successfully treated, and then reported.

This writer believes that a careful study of all newborn infants, and a postmortem examination of all stillbirths and deaths occurring during the

[1]The word "atresia" from the Greek "Atretos"—not perforated—is usually used in medical literature to denote the absence or closure of a natural passage or channel of the body. Many now use this term when discussing the intestinal tract to describe the partial or complete intestinal obstruction resulting from an early-acquired intrauterine malformation of the fetal intestinal wall. Others still use the terms "atresia" and "stenosis" to describe the pathological lesions in their cases and then will record all cases as those of intestinal atresia. Medical terms, as well as medical procedures, are flexible and subject to change as our knowledge increases. This is seen when we study many of our commonly used medical terms: the word "hysterectomy" is derived from the Greek "Hustera" (uterus) and "Extome" (excision). Therefore, "hysterectomy" means complete excision of the uterus which includes both the body and the neck or cervix. Total or complete, and subtotal, partial, or supracervical hysterectomy are now considered correct medical terms.

first few weeks of life will show that approximately 1 baby in every 1,500 born will have an atresia of the intestinal tract. If correct, and if the condition occurs uniformly throughout the world, this condition is taking the lives of about 3,000 babies annually in the United States and of more than 50,000 in the rest of the world.

### ETIOLOGY

Many theories have been advanced to explain this malformation of the intestinal wall which occurs in the first few weeks of intrauterine life.

The commonly accepted etiology concerns the persistence of the physiological epithelial occlusion which for a short time in the second month of intrauterine life apparently obliterates portions of the already present intestinal lumen. Then lack of normal development (arrest of development without vacuolation and re-establishment of a patent lumen) causes the membranous and cord-like total atresias, and partial vacuolation and recanalization account for the subtotal atresias. It is questionable whether this failure of normal vacuolation and recanalization can account satisfactorily for the many varieties and types of atresias, which may occur in the same individual.

The considerable number of cases with a gap in both the bowel wall and mesentery, and in the small and upper large intestines (in which physiological epithelial occlusion is seldom if ever observed), and the complete or almost complete absence of the membranous types of occlusion in the esophagus (in which physiological epithelial proliferation to the point of apparent occlusion is almost invariably observed) allow one to believe that some other factor or factors come into play to produce this malformation. The so-called annular pancreas with complete separation of the duodenum, the blind end of the proximal ileum forming the contents of an omphalocele, the apparent excessive involution of the omphalomesenteric duct, and the single congenital cord (remnant of a vitelline vessel) floating free in the abdominal cavity—conditions frequently found in these cases—have to be considered in the etiology of intestinal atresia.

Perhaps in the strictest sense this condition is not what we think of as a congenital anomaly resulting from an incomplete or excessive development of the fetal intestine. It may be the natural result of a simple accident occurring with a frequency determined by the law of chance.

The atresia occurs during the period of normal migration and rotation of the intestines. Both sexes and apparently all races are liable equally. There is no proved relation between the age or health of the parents or with the birth order of their children. The lesion is usually the only major defect present other than defects related to the formation of the intestine, its appendages, and their confining walls. About 67 per cent of these infants are born at term and about 80 per cent of all of them appear perfectly normal at birth and until the obstructed bowel begins to fill first with swallowed air and then with food.

In a study now in preparation, which the writer hopes to present soon, he shows with cases and observations what he believes is quite definite proof that an atresia of the intestine is caused by a mechanical disturbance which, occurring early in the fetal development with a frequency governed by the law of chance, produces an abnormal bowel wall. It is a congenital malformation only because the accident occurred during intrauterine life.

### VIABILITY, MORBIDITY, AND MORTALITY

With few exceptions the newborn infant with a total or high-grade subtotal atresia dies during the first few days of life unless the obstruction is relieved by surgical means. The infants relieved by enterostomy alone are given a few more days of life. Those with a low-grade subtotal atresia, who do not have obstructive symptoms in the first few weeks of life, may appear normal until solid food is added to the diet or some foreign body such as a fruit pit blocks the partially occluded bowel. Among the series of 1,498 cases there were 56 adults (16 years of age or over) with one or more subtotal atresias. Some cases were apparently asymptomatic and found at autopsy; others were located during exploratory laparotomies.

It is interesting to know that 1,141 patients, or 76.2 per cent of the total, have died, without or with operation, during the first month of life, the majority having died during the first few days of life. The highest mortality rate was found in cases of jejunoileal atresia, the most common type and the one in which operation is done most frequently. The average length of life of the untreated patients with nonviable, total or high-grade subtotal, atresia is 5.8 days with no appreciable difference for the various types or positions of the atresia. The time of death following operation, together with other information given in the case reports, seems to prove that the major causes of death in the unsuccessfully treated cases are: (1) nutritional disturbances plus dehydration shock; and (2) either localized peritonitis which interferes with normal anastomotic stoma function, or general peritonitis. Both types of peritonitis are due to either gross contamination or

later leakage at the site of an artificial anus or an anastomosis. Only 139 patients with intestinal atresia, in all age groups, have been treated successfully. In these, normal continuity of the bowel was restored, or the obstructed portion of the bowel was bypassed by performing a side-to-side or lateral anastomosis. Included are 8 cases of gastric or pyloric atresia, 86 cases of duodenal atresia, 39 cases of jejunoileal atresia, and 6 cases of atresia of the colon. Two of the patients—2 of only 13 infants in whom resection and anastomosis for an atresia of the jejunum or ileum was done successfully—were treated and later reported on briefly by the writer in 1948. In both an ileostomy was performed soon after birth. Two days later, through a clean field at a distance, an intraperitoneal lateral anastomosis was constructed in the loops of bowel just before they emerged to form the double ileostomy. The "functioning" ileostomy was left intact (for a time) to complement and protect the anastomotic stoma. These 2 boys, now 2 and 8 years old, respectively, are healthy normal children. It has been interesting to find in this general review, complete to 1950, that, contrary to almost universal opinion, only 5 infants with an atresia of the small intestine (jejunum or ileum) have been successfully treated by primary resection and anastomosis, and 2 of these cases were reported more than 20 years ago.

Many are of the opinion that the newly born infant possesses a greater vitality and thus is better able to withstand anesthesia and major abdominal surgery during the first few days of life than during the days that follow. This frequently expressed thought may be more apparent than real. The newborn infant (as well as patients in other age groups) with an intestinal obstruction or other nonviable condition demanding surgery should be a better surgical risk when the condition is diagnosed and operation is done early. The writer believes that with our advance in knowledge of the value of a planned preparation and aftercare of surgical patients, the infant at any age should be a good operative risk, especially when careful attention is given to his water, electrolytic, and vitamin balances, and there is proper appreciation of his hemoglobin and serum protein values. These are of extraordinary importance in early infancy which is the critical period of change and physiological adjustment from intrauterine life to postnatal independent existence.

## DIAGNOSIS

An atresia is the most common cause of intestinal obstruction present at birth or developing during the first few days of life.

One of the most important factors in the early diagnosis of an atresia or other obstructive lesion in the newborn or early infant is the realization that the well observed newborn and older infants die because of some pathological condition, and seldom, if ever, from food dyscrasias or functional disturbances. Each baby who passes little or no meconium, vomits, shows progressive dehydration, and usually some degree of abdominal distention should be considered to be acutely obstructed until proved otherwise. During this period of observation and study the infant should be kept in the best possible physical condition.

The absence of meconium or the presence of small amounts of meconiumlike material should be noted carefully and recorded; a stool specimen, if obtained, should be sent for pathological study. A meconiumlike stool is often passed in cases in which the obstruction is high in the intestinal canal; it may appear as normal meconium if the atresia is above the opening of the biliary and pancreatic ducts. The absence of the fetal elements (shed from the fetus in utero and then normally swallowed with the amniotic fluid) in the meconiumlike material passed or removed from the lower bowel is positive proof of an early-acquired intrauterine intestinal obstruction, most probably atresic in nature.

As recently stressed by Madding, Everhart, and Heath, the specimen of stool must be collected with care, otherwise a false-positive test for stratified epithelial cells (of amniotic fluid origin) may confuse the diagnosis and cause the loss of valuable time. In obtaining their specimen of stool by digital means, these workers found that the keratinized cells in the meconium smear were those which had been wiped inadvertently from the infant's buttock. In their 4 day old, successfully treated patient they found a total atresia of the lower duodenum which had been verified first by the scout-films and later by the gastrointestinal serial films which showed dilatation of the stomach and upper duodenum with absence of air and radiopaque material in the intestine below the complete occlusion. They suggest that when the stool to be tested has to be obtained by digital means from the lower bowel only the central portion (which has had no contact with the skin) should be used for the examination.

In 1933 Farber was impressed with the importance of the study of the first bowel movements in the diagnosis of these cases. He outlined a simple staining method for identifying the cellular elements of normal meconium. Those interested in this subject should read Jacobi's classical article on the observation and clinical study of the baby

with an intestinal atresia, for in 1861 this New York pediatrician stressed the cardinal points in the diagnosis of this condition. He was one of the first to note that the fetus in utero swallowed amniotic fluid and that the hard, horny, pavement epithelial cells and other fetal elements suspended in this fluid were the normal constituents of meconium. He was probably the first to teach that the absence of these elements in meconium was positive evidence of an early-acquired intrauterine total atresia of the intestine. He also showed that the color of the meconiumlike stool and the yellowish gray masses removed from the rectum (in his case a newborn child with 4 total atresias with interruptions in the lower jejunum and ileum) were not due to bile pigments which normally passed through the intestinal tract, but possibly were due to the re-excretion of bile pigment from the blood into the lower intestinal tract. Jacobi was also the first to diagnose clinically and correctly an intestinal atresia in the living infant.

The infant with an intestinal atresia usually has a flaccid nontender abdomen even in the presence of marked distention. The bowel wall and mesentery are, except for the atresic portion, little damaged unless the obstruction is low in the intestinal tract and the obstructive process has been going on for some time. Tenderness and rigidity, as well as distention, are seen more often in cases with a volvulus, intra-abdominal hernia, or intussusception in which the strangulated, infarcted, or gangrenous bowel sets up a local peritoneal irritation. The anus and lower rectum, except for being somewhat small, feel normal to the examining finger; the palpating finger then usually meets an apparently complete obstruction as the upper rectum and sigmoid are reached.

The scout-film or plain-film roentgenogram, which is never contraindicated, should be taken of the newborn or older infant showing any signs or symptoms suggestive of intestinal obstruction. Dilated loops of bowel, fluid levels, or the absence of air in the distal portion of the intestinal tract are important findings in making the diagnosis. Before vomiting, distention, or other signs are apparent, the roentgenologist can often recognize and locate the obstruction by the absence of intestinal gas shadows which are normally present in the newborn and infant periods of life. Normally the infant swallows air immediately after birth; the stomach is distended immediately, by the second hour the small intestine distends, and by the fourth hour the large bowel.

Occasionally gas pockets may be seen in the lower bowel in an infant born with a total atresia of the duodenum or small intestine. This can happen only when air is introduced by the examining finger, rectal tube, or enema. An enormously dilated loop of small intestine at times can be mistaken easily for a dilated large bowel. In either case the barium enema study will be of great value in making the correct diagnosis. The usual barium enema examination shows that the column of barium mixture thins out and ends abruptly in the area of the splenic flexure of the colon. The colon wall is smooth and does not show the haustrations usually seen in the normal colon of the newborn. Failure to interpret these x-ray findings correctly has led many of us to enter the lower left abdomen to find an atresia of the ileum which should have been approached through an incision on the right side.

The "microcolon"—the never-used and therefore never-functioned bowel below an early acquired intrauterine intestinal occlusion, distal to the ampulla of Vater—has the same characteristics even though the obstruction may have been due to an atresia, meconium ileus, or some extrinsic cause. The collapsed and apparently atrophied cordlike bowel is anatomically and physiologically normal; the small lumen may retain a little mucus and a few particles of inspissated meconiumlike material, free of amniotic fluid elements and intestinal bile pigments. In 1945 McConahay showed that these "microcolons" could be dilated throughout their length and stimulated to normal activity. He studied the intestinal tract below several complete atresias of the ileum in a 2 day old infant. With the barium enema given under controlled pressure, first the colon and then the cecum and terminal ileum were dilated and received the barium. After they were filled with barium, evidence of normal intestinal peristalsis was noted. Definite haustrations not present before began to appear and, finally, the barium mixture was passed voluntarily from the rectum, eliminating almost all that was present in the terminal ileum, cecum, and colon.

The differential diagnosis of acute intestinal obstruction in the newborn and early infant periods, except for meconium ileus, is apparently becoming of less importance. The obstructing lesion in each case demands surgical correction, and in almost all cases it can be reached easily through an abdominal incision on the right side. However, it is well to remember that the newly born infant with a cerebral injury may vomit and show other signs suggestive of intestinal obstruction. In such a case, the history of the bowel movements, the type of vomiting, and the neurological and roentgenological examinations should lead to a correct diagnosis. It is also well to remember that the

newborn with a total atresia of the esophagus usually has a tracheoesophageal fistula distal to the blind proximal esophageal segment and will show intestinal gas shadows on the scout or plain films.

Meconium ileus—the second most common form of intestinal obstruction present at birth—must be considered and differentiated from an atresia before or at time of operation, if possible. With meconium ileus the obstruction, always in the lower ileum and due to inspissated tough meconium, is apparent at birth or within a few hours after birth. With atresias, the obstruction is usually not noted until 12 or more hours after birth or until the obstructed bowel is filled with air and food. While both atresia and meconium ileus demand immediate surgical correction, the intestinal wall throughout its entire length in the case of meconium ileus is anatomically and physiologically normal, and, according to the more recent literature, it does not have to be resected unless it is gangrenous due to obstruction.

Zimmer believes that meconium ileus can be differentiated from an atresia of the lower ileum when the plain films are carefully studied. In meconium ileus there are no fluid levels in the intestinal pattern and the distended loops contain coarse granulated fecal matter, while the collapsed bowel just distal to this segment contains hard lumps of dehydrated meconium. In atresia there are usually fluid levels and the granulated fecal matter is not seen on the films. He believes that the absence of fluid levels in cases of meconium ileus is due to the inspissated content of the bowel and that these findings are probably pathognomonic of this condition. Hiatt and Wilson, who noted fluid levels in some of their cases, believe that the most important criterion is the hard consistency of the abdomen noted on palpation. The writer has collected and studied the original case histories of 142 cases of meconium ileus.

During both the period of diagnosis and observation, and at operation a careful search should be made for other malformations or abnormalities of the intestine, its appendages, and their confining walls. In an analysis of the cases reported the writer was amazed to find the number of cases in which a second or third type of congenital intestinal or bile duct occlusion was associated with the atresia, and in many cases was the cause of death after an apparently satisfactory correction of the intestinal obstruction. There were in this series of cases with one or more intestinal atresias the following associated abnormalities: 15 cases with an atresia of the esophagus, 10 cases with familial hypertrophic pyloric stenosis, 32 cases with an annular pancreas (the pancreatic tissue encircled the duodenum and in many cases there was a gap with pancreatic tissue between the blind ends of the divided duodenum), 23 cases with atresia or other malformation of the bile ducts, 78 cases with a volvulus of the small intestine, 9 cases with an intussusception, 55 cases with an omphalocele or an umbilical fistula of omphalomesenteric duct origin, 25 cases with an imperforate anus or persistent physiological anal membrane (lower sigmoid and rectal atresias excluded).

SUMMARY

This study comprises a review of the literature on atresia of the gastrointestinal tract. The histories of 1,498 cases of atresia of the intestine, excluding the esophagus and rectoanal canal, have been reviewed and the important findings summarized. Special attention has been given to the incidence, etiology, and diagnosis of this condition. The morbidity, mortality rate, and opinions concerning the viability of the newborn infant with an intestinal obstruction are discussed.

Except in a few cases, the failure to diagnose early or to treat successfully the newborn with an intestinal atresia is stressed. The successfully treated 139 patients—in all age groups—including 2 newborn with an ileal atresia treated by the writer, are listed and their cases are discussed.

It is recommended that the terms "subtotal" or "incomplete" atresia and "total" or "complete" atresia be universally adopted to describe and record in the literature the cases in which there is an incomplete or complete obliteration of the lumen of the bowel because of an early acquired intrauterine malformation of the bowel wall.

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# ABSTRACTS OF CURRENT LITERATURE

## SURGERY OF THE HEAD AND NECK

### HEAD

**Thrombosis of the Cavernous Sinus.** WILL P. PIRKEY. *Arch. Otolar.*, Chic., 1950, 51: 917.

The author reports a case of thrombosis of the cavernous sinus with recovery in spite of generalized cerebral hemorrhage. The patient was a 40 year old Negro who developed a furuncle on the cheek which had been squeezed, lanced by a physician, and treated with penicillin before admission to the hospital. The positive findings were an indurated swelling of the cheek, closure of the eye, palpable facial and angular veins as far as the inner canthus, second degree proptosis, orbital edema, ptosis of the lid, dilated and fixed pupil, paralysis of the lateral rectus muscle, elevated temperature and white blood count, and 540 white blood cells per cubic millimeter of spinal fluid.

The patient was treated with penicillin, sulfadiazine, and intravenous heparin every 4 hours, maintaining the coagulation time at or near 30 minutes. In spite of treatment the physical signs progressed to the other eye during the first 3 days. On the third day there developed disorientation and a severe chill following a dose of heparin. Four hours later the coagulation time was 35 minutes. Streptomycin therapy was started and sulfadiazine was discontinued following the positive culture of Staphylococcus aureus and susceptibility tests. The patient began to improve, but on the fifth day, after heparin, there developed marked disorientation, nuchal rigidity, hyperactive reflexes, a coagulation time of 40 minutes, and 2,160 red cells per cubic millimeter of spinal fluid. The intracerebral hemorrhage was considered to be induced by the heparin and the latter was discontinued, after which the patient made a complete recovery. No comment is made by the author as to whether heparin should be used in the future in the treatment of this disease.

N. CHRISTIAN MEYER, M.D.

**Small Triangular Flap Operation for the Primary Repair of Single Cleft Lips.** JAMES BARRETT BROWN and FRANK MCDOWELL. *Plastic & Reconstr. Surg.*, 1950, 5: 392.

The advantages of the small triangular flap operation for the primary repair of single cleft lips have become apparent following observation of the results throughout most of the growing period in many children. It produces a full, loose lip with a normal forward thrust of the lower border, and a smooth, uniform vermilion. The simplified design puts the key (marked) points in a constant relationship to the normal anatomical landmarks and effectively plans for the best possible symmetry of the nostrils. Photographs showing original defects and progressive results are presented.

The elements of individual deformity in the patient at hand are carefully considered and the points are punctured in with a mechanical drawing pen, using 5 per cent alcoholic methylene blue, and the lines are usually gently incised just through the epidermis. Points A-B-C are marked out on the columellar side of the cleft, to be later joined to points A′-B′-C′ on the alar side in closure of the lip. Temporary points X and C″ are also marked out, as they are useful in the determination of some of the final points. To mark point A, the columellar side of the lip is pushed over into the cleft, until the columella is straight and in the midline. A is then

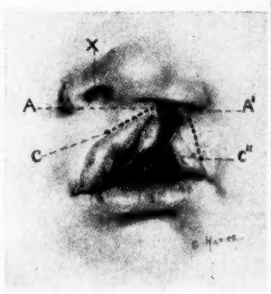


Fig. 1 (Brown, McDowell).

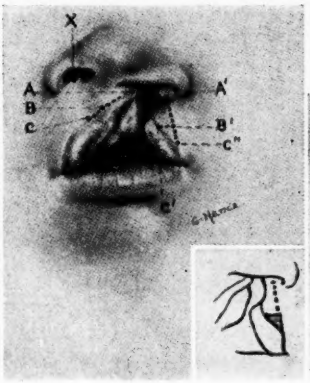


Fig. 2.

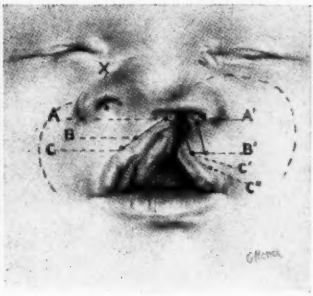


Fig. 3.

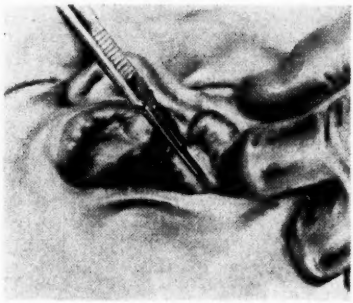

Fig. 4 (Brown, McDowell).

Fig. 5.

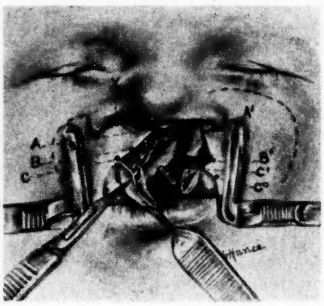

Fig. 6.

punctured in the skin at the mucocutaneous junction on the level of the bottom of the columella. Point X is punctured in the corresponding position in the other nostril floor (Figs. 1 and 2). The relationship of X to the base of the normal ala is noted, and A′ is placed in the same relation to the base of the ala on the cleft side. The full thickness of vermilion is then visualized on the columellar side of the lip and followed across toward the cleft to the point where it first begins to thin out. This is point C. The distance A-C is measured with fine calipers. One point of the calipers is then placed on A′; on rotating, the place where the other point crosses the mucocutaneous junction (below the ala) is point C″. The line A′-C″ is then marked with dye on the fine pen (Figs. 1 and 2).

Point C′ is on the mucocutaneous junction on the alar side where the vermilion first begins to thin out. Point B′ is on the line A′-C″, equidistant from C′ and C″. C′-B′-C″ is the small triangular flap which is saved by this design to provide extra tissue to fit in the triangular defect at the lower edge of the lip on the columellar side. The flap is an isosceles triangle, usually about one-fourth the length of the lip (Fig. 2). Point B is marked on the mucocutaneous junction on the columellar side, B′-C′ distance toward the cleft from C. An additional final check on the marking can be obtained by measuring the distance from point X vertically down to the mucocutaneous junction. This is the normal length of the lip, and the distance A-C should never exceed it.

The lines A-B-C and A′-B′-C′ are lightly incised with a No. 15 knife, with care to avoid cutting off of the points (Fig. 3). An incision is then made up inside of the buccal fornix on the cleft side (Fig. 4), extending from the molar region to the inside of the nostril, and the lip and cheek are dissected loose from the maxilla almost up to the orbital floor (Fig. 3). If necessary, a small vertical extension of the incision is carried upward inside of the nostril just in front of the lower turbinate. A small scissors is introduced up through the undermined area and, by spreading it, the skin over the nostril is elevated (Fig. 5). As the nostril has to be rotated toward the columella, which is its proper direction, not going flush into the face, both the inside and the outside surfaces have to be rolled up from practically a straight line, in many patients, into a circle. This separation of the surfaces allows them to slide on themselves.

Now the lip and cheek should be loose enough so that the lip can be put across the cleft with almost no tension. Similar undermining, though not nearly so extensive, is carried out on the columellar side. After hemostatic lip clamps are placed on both sides, the lines A-B-C and A′-B′-C′ are cut perpendicularly through the full thickness of the lip by means

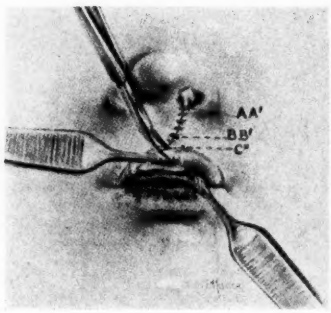


Fig. 7.

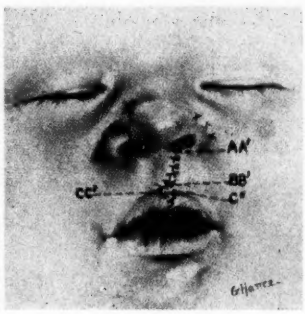


Fig. 8.

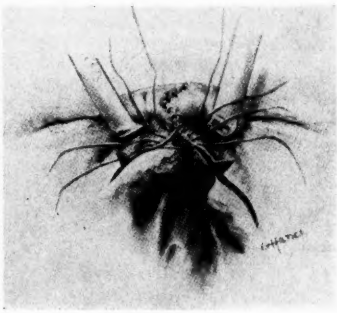

Fig. 9.

of a stab blade (No. 11) and with a sawing motion (Fig. 6). All angles are opened cleanly and, to prevent including any skin in the vermilion, any slivers of skin are removed from the vermilion flaps (Fig 6).

A′ is closed to A with a deep fine catgut suture with the knot on the mucosal surface and with a narrow No. 000 black silk suture on the skin surface. B′ is closed to B with a deep white silk stitch and a No. 000 black silk suture on the skin surface. The skin edges in between these points are approximated with the finest possible interrupted silk sutures, very close to the edge, and tied loosely with multiple knots (Fig. 7).

With a fine scissors, a cut is made halfway through the vermilion flap on the alar side, this cut forming a 90 degree angle with the line B′-C′ (Fig. 7). C′ is then approximated to C, as are the intervening skin edges. The vermilion flap from the columellar side is then laid straight across the cut vermilion of the alar side and cut downward diagonally and outward from C to fit it. These points of vermilion are joined, and both vermilion flaps are then cut off along a line which goes back medially at a 90 degree angle to end directly under C. These interdigitating flaps of vermilion are fitted together smoothly and the closure is carried on around the whole vermilion (Fig. 8).

The mucosa on the inside is closed clear up to the fornix (Fig. 9). Interrupted fine silk sutures are used and any necessary trimming is done to get the mucosal approximation as accurate as the skin closure. This careful mucosal closure clear up into the fornix thrusts the entire lip forward as nothing else will, and cannot be substituted for by a few stay sutures as has been suggested so often.

The lip is put in its forward position as accurately as possible with the inherent parts and positions in place, and finally it is held snugly together with stay sutures. The forward position cannot be maintained by simply jamming it forward with stay sutures. If the upper edge of the mucosa all the way across seems tight after the closure, vertical relaxing slits may be made in it on either side, which allows some of the buccal mucosa to come forward into the lip. Stay sutures should never be put through the skin side. The nostril is packed lightly with grease gauze and a Logan bow is fastened across the lip.

The nurses keep the suture line clean, using forceps and little pledgets of gauze soaked in alkaline antiseptic solution. The baby is fed with a syringe for a few days. The outside sutures are removed in 5 days and the inside ones in 10 days.

JOHN L. LINDQUIST, M.D.

**Reconstructive Surgery of the Maxillae** (Cirugía reconstructiva de los maxilares). HECTOR MARINO. *Dia méd.*, B. Air., 1950, 22: 656.

In this discussion the author eliminates the enormous chapter on fractures, properly speaking, also the matter regarding the lesions of the teeth which should be under the care of odontologic surgeons. Nevertheless, he continually stresses the need for collaboration of the dentist, the dental surgeon, the traumatic surgeon, and what he calls "a prosthetic ist" whose duty is to furnish the proper prosthetic appliances and see that they fit.

The reconstruction work should be instituted as soon as possible after the accident, because of the rapid consolidation of fractures about the face and the later difficulties in correcting deformities by the proper replacement of the fragments and the further difficulty of retaining these old chronically adheded fragments in place after they have been properly reduced. Another general principle with reference to this type of surgery about the face is that no bone fragments should be removed even though they are apparently freed of all vascular nutritive connections. Excision of soft tissues should be as sparing as possible—much more sparing than in wounds elsewhere in the body—and the soft tissues should be immediately reunited as accurately as possible in their normal position and relationships.

If the corrective surgery cannot be completed at once the consideration of placing the parts in as favorable a position as possible in preparation for future intervention becomes at once of the greatest importance. In this connection the importance of preventing retraction of the soft tissues with elastic appliances or with temporary prostheses is apparent.

For repair work about the face the author ardently recommends the use of living tissue in general and of autoimplants in particular. For bone material he prefers spongy bone tissue, and includes cortex of bone only when a robust support is needed. The osseous material is obtained from the ribs, rib cartilages, and from the crest of the ileum. The crest of the ileum furnishes the best material for general purposes; such spongy tissue is surprisingly resistant to infection and regenerates and consolidates with extreme rapidity and facility. Cartilage will prove useful where a modicum of elasticity is required.

Fractures of the malar bone are reduced, as a rule, by the maneuver of Gillies; if this is impossible there is added a gingivolabial incision. If it seems advisable, the maxillary sinus may be opened and packed firmly with gauze until such time as the deformity would promise to remain corrected. If the malar zone is largely destroyed, or for other reasons will not support the malar prominence, it may be replaced by a block of muscle tissue brought down from the temporal muscle from beneath the zygomatic arch. In all cases, of course, the support to the floor of the orbital cavity is paramount in order to prevent sinking down of the eye and the loss of binocular vision. If necessary for this purpose, a prosthesis must be worn. However, even here modern surgery is solving the problem; bone spongiosa can be laid over the mass of temporal muscle tissue and the floor of the orbital cavity reformed in this manner. If a prosthesis must be worn it should be well padded after the manner of Esser.

If a part of the palate is also lost an attempt is made to close the defect with a local mucosoperi-

osteal flap; in more extensive defects a flap of mucosal tissue from the cheek will be added. In still more extensive defects the method of Young must be resorted to, that is, the flap will contain not only the mucosa and periosteum but also a shell of bone to serve as a framework to hold the flap in place. Unfortunately, such procedures can be applied only to the adult. In children a good prosthesis will be preferable in some cases.

In the mandible smaller defects may be safely left to the regenerative powers of the mandibular periosteum. For displacing the point of the chin forward or backward the author has for years employed the technique of Lindermann; however, a simple bone or cartilage implant will often render this operation unnecessary. For extensive loss of substance of the mandible, plastic surgery or a prosthesis may be employed; however, the surgeon must remember that a successful correction will always require sufficient soft tissue with sufficient elastic properties to cover the new construction. Such a correction may require pediculated flaps from the adjacent or from distant regions. For such cases the author frequently uses the method of Esser, that is, the retracted tissues are freed and coated internally by a skin flap and the whole is stretched out on some form of prosthesis (acryline) until such time as the implant heals in place. There may then be sufficient room for the bone correction. If a temporary or permanent prosthesis be used for the bone defect it must hold the fragments firmly in the mandible; it must be attached to the teeth or form a sort of trough for the edentulates or the young children, or it may even require an external apparatus of the character of that introduced by Stader in orthopedics, or the apparatus of Mowlem used in orthodontia. On occasion, in the edentulates and in young children the method of Byars may be used. The Byars method of intraosseous immobilization has the advantage in that the muscles of mastication are not given the opportunity to assume the contracted state; they immediately recover their functions and permit a completely successful result both as regards morphology, phonation, and mastication. JOHN W. BRENNAN, M.D.

## EYE

**Exophthalmos** (Exophtalmie). JEAN LAPOINTE and FERNAND CROISETIÈRE. *Union méd.*, Canada, 1950, 79: 638.

The causes of exophthalmos vary and are not always easy to discover; they may be of a local or symmetrical nature, the latter being the most difficult to trace; the causes may be tumoral, inflammatory, vascular, hematologic, endocrine, and even allergic.

The tumors, which may cause exophthalmos, may originate in any of the tissues of the orbit or its vicinity, and may be benign or malignant. They may evolute rapidly or slowly, depending on their particular nature, and displacement of the eyeball forward or backward occurs only when the tumor has reached the volume of the eyeball itself. It must also be remembered that tumor of the orbit is often only an expansion of another intracranial tumor. The differential diagnosis of intraorbital and intracranial tumors is of great importance. A new diagnostic method consists of cerebral angiography which localizes the tumor.

The principal inflammatory reactions which cause exophthalmos are acute or chronic myositis, cellulitis, retrobulbar abscess and tenonitis. For some of these, it is possible to discover a specific cause (syphilis, tuberculosis, some neighboring lesion like frontal or maxillary sinusitis, dental abscess, etc.); other lesions seem to be primary. Primary acute and chronic orbital myositis is very rare, but increases in frequency when associated with other orbital inflammations. Orbital inflammations are characterized by axial and direct exophthalmos, palpebroconjunctival symptoms, the appearance or accentuation of limitation of eye movements, and often complications in the eye involving especially the optic nerve, which may be compressed or invaded by inflammatory elements. Inflammation of the cornea may lead to ulcer and even perforation, trophic disturbances being added to the infection; however, these complications are rather rare.

Vascular disturbances, such as vascular fragility, arteritis, arteriosclerosis, arteriovenous aneurysm, and varicose veins, cause exophthalmos by hemorrhage into the orbital cavity, by thrombosis, or by considerable dilatation of the vessels. If exophthalmos is due to varicose veins, it will be more marked when the patient bends his head forward. If exophthalmos is due to arteriovenous aneurysm, it will be pulsatory, and stethoscopy over the temple or under the eye will reveal a typical sound.

Blood diseases, especially the leucemias, rather often give rise to orbital lymphoma, lymphosarcoma, and other lesions, and hemorrhagic purpura and the other blood dyscrasias may cause orbital hemorrhage in sufficient amount to produce exophthalmos.

Not to be overlooked are the allergic edemas in the course of Quincke's acute edema, but they disappear as soon as the allergic phase has passed.

Exophthalmos of endocrine origin is seen in toxic goiter. The most plausible theory seems to be that of edema of the orbital tissues caused by the thyrotropic hormone of the anterior hypophysis. Unilateral exophthalmos may be an early and only sign of goiter. Cases of exophthalmos have been reported in connection with menstruation and the menopause. In addition, it has been shown that folliculin therapy is of aid in certain cases of Basedow's disease, without known reason.

Treatment is nearly always causal and it is rare not to find the cause. RICHARD KEMEL, M.D.

**Metastatic Carcinoma of the Eye.** JAMES N. GREEAR, JR. *Am. J. Ophth.*, 1950, 33: 1015.

The author presents his studies on a group of patients under treatment for carcinoma. Metastases

to the eye are more common than is usually supposed and frequently occur following primary carcinoma of the lung and breast. The ocular metastases involve the ciliary body, iris, optic nerve, sclera, retina, and choroid.

All patients with primary carcinoma of the lung or breast should be carefully examined for eye lesions. If lesions are found in the eyes, it is an indication that generalized carcinomatosis has occurred, and radical surgery should be performed only for pain.

EARL H. MERZ, M.D.

**Intraepithelial Epithelioma of the Conjunctiva and the Cornea (Bowen's Disease) Healed by Contact Radiotherapy.** J. FRANCOIS, J. KLUYSKENS, and M. RABAEY. *Brit. J. Ophth.*, 1950, 34: 360.

The epithelial epithelioma is a tumor characterized by a proliferation of epithelial cells within the epithelium itself. There is no perforation of the basal membrane, at least until after a long period of time has elapsed, no invasion of the neighboring tissues, and no formation of metastases. The treatment has been disappointing. Local excision and electrocoagulation is often followed by relapse. Roentgen and radium therapy have been unsuccessful. A case is presented of an intraepithelial epithelioma which healed completely and without sequelae when treated with contact radiotherapy.

The patient, a 57 year old male, noted a gradually enlarging tumor of the right conjunctiva 1 year earlier. The mass measured 5 by 8 millimeters and encroached slightly upon the cornea. It was whitish in color with irregular sharply demarcated margins and was slightly mobile. In the biomicroscope, the tumor appeared to be composed of numerous regular follicles arranged in a mosaic. Microscopic study showed a typical picture of intraepithelial epithelioma.

The patient was treated by contact roentgen therapy which brought about a complete and rapid recovery. A total of 5.150 roentgens was given in 10 sessions. Six months following treatment recovery was still complete. FRANK W. NEWELL, M.D

**Studies on the Crystalline Lens. Technique for in Vitro Culture of Crystalline Lenses and Observations on Metabolism of the Lens.** FREDERIC C. MERRIAM and V. EVERETT KINSEY. *Arch. Ophth.*, Chic., 1950, 43: 979.

An apparatus was designed to provide the lens with an environment similar to that in which it exists in vivo. A culture tube, sterilized before use, contained the nutrient media which was changed at 24 hour intervals. A gas distributing system, consisting of 90 per cent nitrogen and 5 per cent each of oxygen and carbon dioxide at a pressure of 10 pounds per square inch, supplied oxygen for respiration and carbon dioxide for maintenance of the buffer system. A water bath maintained constant temperature at 37°C., and a modified Burrell mechanical rocker minimized local differences in concentration of metabolites or waste products.

The aseptically removed rabbit lenses remained essentially clear during the 15 day period of study; however, the concentration of glutathione and ascorbic acid decreased, as did also the utilization of dextrose and the production of lactic acid. These changes indicate that the loss of transparency may be a relatively late secondary effect of metabolic changes. The glutathione content was maintained at more nearly normal levels in the artificial medium supplemented with amino acids—320 mgm. vs. 185 mgm. per 100 gm. of wet tissue. This suggests that glutathione may be synthesized by the lens.

JAMES E. LEBENSOHN, M.D.

**Retinoblastoma. Analysis of 17 Autopsies.** GEORGE R. MERRIAM, JR. *Arch. Ophth.*, Chic., 1950, 44: 71.

Seventeen autopsy reports on histologically proved cases of retinoblastoma are analyzed. Ten of the patients were males and 7 were females. The right eye was involved in 9 cases, the left eye in 3, and in 5 the disease was bilateral. The average age of the patient at the onset of symptoms was 1 year and 5 months, and the average time of onset of the recurrence after the completion of treatment was 3½ months. The average time of death after the completion of treatment was 7 months.

Sixteen of the patients (94.1 per cent) had some form of intracranial metastasis. Only 8 (47 per cent) died with the disease confined to the head and/or spinal cord. In the other 9 patients (53 per cent) there were distant metastases in addition to those present within the skull. The lymph nodes were involved in 8 cases, the skull bones in 9, distant bones in 9, and the viscera in 8 cases.

The most important aspect of this analysis is the finding that retinoblastoma is by no means the purely local and cranial disease it is so often considered. It is, rather, a highly malignant, widely disseminated neoplasm. It must be differentiated from glioma of the brain, which has no metastases.

FRANK W. NEWELL, M.D.

## NOSE AND SINUSES

**The Management of Malignancy of the Maxillary Sinus.** ARNOLD A. GROSSMAN, W. ALLAN DONNELLY, and MAURICE F. SNITMAN. *Canad. M. Ass. J.*, 1950, 62: 576.

Ten patients with cancer of the maxillary sinus varied in age from 12 to 65 years. Three had metastases in the cervical lymph nodes when first seen. The histologic types were squamous cell carcinomas, 6; transitional cell carcinomas, 2; cylindrical cell carcinoma, 1; basal cell carcinoma, 1; and melanoma, 1. One patient suffered bilateral involvement. The left maxillary sinus developed a transitional cell carcinoma 2 years after the patient had apparently been successfully treated for a squamous cell carcinoma on the right side.

The most common symptom was unilateral nasal obstruction. Other symptoms were nasal discharge, bleeding, pain, anesthesia, and paresthesia.

Biopsies do not always produce a conclusive diagnosis and should be repeated when there is clinical suspicion of malignancy. The histologic type of malignancy is of academic interest but should not radically influence the therapeutic management of any given case.

All patients underwent preliminary external carotid ligation. The neoplasm was destroyed surgically with the aid of electrosurgery and electrofulguration, using the sublabial route. Radium was then employed in various forms, preferably as a radium plaque enmeshed in vaseline gauze. Usually between 1,500 and 3,000 mgm. hours of radiation were administered to the operative site. Deep x-ray therapy was also given by the fractional dose technique in dosages varying from 4,000 to 6,000 roentgens.

It is only by employing all methods of treatment that success can be expected in any given case. No certain cures were reported.

JOHN R. LINDSAY, M.D.

## PHARYNX

**Discussion on the Tonsil and Adenoid Problem.** R. S. ILLINGWORTH. *Proc. R. Soc., M., Lond.*, 1950, 43: 317.

Well controlled studies of the indications for, and results of, tonsillectomy and adenoidectomy are difficult to find in the literature. Bacteriologic studies, details of findings, treatment, general health, associated diseases, and follow-up studies are often lacking. Inaccurate diagnoses lead to many unnecessary operations. The indications for tonsillectomy and adenoidectomy are not clearly established.

The function of the tonsil is still not known; also, we do not know the importance of the tonsil as a focus of infection. The relationship of the tonsil to cervical adenitis, pharyngitis, and nephritis is not completely clear.

The appearance of the tonsil is not as important a factor in determining the necessity for surgery as are the history and symptoms. The otolaryngologist is the only one who should make the decision as to whether surgery is necessary. Tonsils should never be removed before the age of 4 years.

The indications for tonsillectomy are:

1. The operation should be recommended by a physician or surgeon only if he would have it done on himself, under the same circumstances, or on his own child, due regard being paid to the possible risks of the operation.

2. Tonsils should be removed because of frequent tonsillitis with fever—three or four attacks a year.

3. Tonsils should probably be removed after a peritonsillar abscess.

4. Tonsils should be removed in the very rare case in which they are so large that they cause obstruction to respiration.

5. Tonsils should probably be removed in diphtheria carriers in whom other treatment has failed.

6. Adenoids should be removed when they are causing obstruction to the Eustachian tube, are causing mouth-breathing, or are preventing the drainage of secretions, at whatever age the trouble occurs.

If operation is to be performed, it is suggested that (1) it be done at a suitable time of the year; (2) it should only be done when the child is an in-patient, never as an out-patient; (3) the child, if old enough, should be told about the sensations he is going to experience; (4) he should be given full premedication, so that he does not experience the unpleasantness and frightening experience of an anesthetic; (5) the operation should be done by dissection; (6) the child should have proper convalescent treatment; and (7) he should be properly followed up so as to ensure that the infection for which the operation was performed has been eliminated.

JOHN R. LINDSAY, M.D.

**Pharyngeal Diverticulum.** SIR THOMAS DUNHILL. *Brit. J. Surg.*, 1950, 37: 404.

In a well organized presentation of pharyngeal diverticulum, the author discusses 28 cases comprising 19 males and 9 females. In 21 of these, surgical correction was carried out.

Anatomically, there is a herniation of mucous membrane through the wall of the pharynx. This usually occurs posteriorly or posterolaterally to the junction of the oblique and circular fibers of the inferior constrictor muscle. In addition there is a lateral slit between the cricopharyngeus and upper fibers of the esophagus which admits a branch of the recurrent laryngeal nerve, a branch of the inferior thyroid artery, veins, and lymphatics. It is thought by some to be a possible site for a diverticulum to herniate. The wall of the diverticulum consists of an outer fibrous tissue which becomes continuous with the muscular layer at the neck of the sac, and an inner layer of mucous membrane.

The etiology of this condition is not well understood. Excessive pressure built up within the pharynx during swallowing does not explain the absence of dysphagia in many patients, and the lack of recurrence following surgery when the cause has not been removed. Congenital factors may be important. This was shown by the histories of members of 2 families in whom diverticula developed.

The symptoms of esophageal diverticulum may be absent, mild, or extremely distressing. Dysphagia and regurgitation of food are the most important symptoms, which may result in undernourishment, or inhalation of food, with cough or pneumonia as a result of the regurgitation. The symptoms are progressive. Diagnosis is made on the basis of history, roentgenograms following barium swallow, and esophagoscopy.

Several procedures for the surgical correction of this condition have been outlined. In a diverticulopexy, the fundus of the diverticulum is fixed higher than its neck, thus providing dependent drainage. This is a good procedure in some cases, especially in the elderly and in cases in which large pouches exist, but is important mainly as a progressive step in the

development of excision. In the two-stage excision, the fundus is sutured to the skin in the first step in order to allow the mediastinal drainage channels to close and prevent the development of mediastinitis. The pouch is then excised in a second operation. Actually, tissue planes leading to the mediastinum are not sealed off as the channel is seen to be wide open during the second stage; however, infection does not seem to occur. Nevertheless, it is messy operating in a field which has been dissected 10 days earlier. A refinement of the operation is to suture the fundus to the skin and strip the mucous membrane through the fundus during the second stage. The channel can then obliterate and there is no necessity for reopening the original wound.

The author prefers a one-stage procedure, and uses a predominately left side transverse incision 1 inch above the clavicle. The area is infiltrated with procaine to define the cleavage planes, and general anesthesia is used. No muscles are divided. With appropriate care for vital structures, the diverticulum is exposed and the fascial covering stripped to its junction with the pharynx. An esophageal tube is passed, the mucous membrane making up the diverticulum excised, the edges being approximated with continuous sutures. The fascial covering is then sutured over this, giving a two-layer closure of the esophagus. Drainage, posterolateral to the sternocleidomastoid muscle, is carried out for 2 days. Soft foods are given orally for 5 days.

There have been no postoperative complications. This is contrasted with the (published) complications following the two-stage procedure. The one-stage procedure is recommended for surgeons familiar with surgery of the neck. The two-stage procedure is probably best for those doing occasional neck surgery and for those who wish to follow the evolutionary progression of the procedure and determine that procedure which best fits them.

ROBERT L. CRAIG, M.D.

**Hoarseness in Children.** JOHN M. LORE, JR. *Arch. Otolar.*, Chic., 1950, 51: 814.

Fifty-six children up to the age of 14, who had been referred to the Ear, Nose, and Throat Department for chronic hoarseness were examined by either direct or indirect laryngoscopy. Patients with laryngotracheobronchitis and acute laryngitis were excluded. Seventeen of these patients were found to have lesions of the vocal cords—14 with thickening of the cord and polyposis, 2 with papilloma, and 1 with a small band at the anterior commissure.

Operation was advised for patients in the first two categories, and 6 patients consented. In the laryngeal operation, the Lore stripping technique was carried out with the use of an Imperatori subglottic forceps. The growth on the vocal cord was removed *in toto* through an anterior commissure speculum. Only one side was done at a time. The patients were allowed to use their voice immediately upon regaining consciousness. Microscopic sections of the diseased tissues were presented. It was found that the hoarseness in all 6 of the patients operated upon improved after the bilateral laryngeal operations were done.

N. CHRISTIAN MEYER, M.D.

**Cervicofacial Actinomycosis—Typical and Nontypical.** MOGENS GLAHN. *Acta chir. scand.*, 1950, 99: 537.

During the period from 1944 to 1948 the author collected 25 cases of cervicofacial actinomycosis, verified by cultivation of the ray fungi, and divided into four bacteriologic groups.

Group I cases consisted of chronic infections caused by actinomyces israeli, with fistulas and painless infiltration. The average duration of the disease was 9 months, and all but 1 of the patients recovered completely.

Group II cases were those which had been present for an average period of 11 months, showed a classic picture, and resulted in complete recovery.

Group III cases showed acute or subacute suppurative lesions related to the oral cavity, with a pathologic picture like that of a simple abscess, with a tendency to become chronic and fistulous. The average duration of the disease was 4 months.

Group IV cases were characterized by subacute, tender swelling, absence of high temperature, and rapid softening. In 3 patients, actinomycetes from more than one group were found.

In a number of cases, the infection probably had its origin in a bone focus connected with the oral cavity. The initial lesion was frequently trauma (extraction or fracture), or infection of the pericoronal space of a partly erupted tooth.

On the basis of these findings, the author distinguishes clinically between two different kinds of actinomycosis: the classic, chronic form, caused by actinomyces israeli, or another well-defined actinomycete (bacteriologic groups I and II); and an acute-subacute form caused by two other microbes of the actinomyces group (bacteriologic groups III and IV), which could be called actinomyces atypica.

S. LLOYD TEITELMAN, M.D.

**Two Unusual Cases of Deep Abscesses in the Neck.** E. H. RAINER. *J. Lar. Otol.*, Lond., 1950, 64: 252.

Abscess of the larynx in childhood is a rarity today. In the last century laryngeal abscess was a common and much feared complication of typhoid fever. Today it occurs occasionally as a complication of perichondritis or osteomyelitis of the laryngeal cartilages. Perichondritis occurs in the adult as a not uncommon complication of malignant disease of the larynx, or its treatment by radiotherapy. In acute tonsillitis or pharyngotonsillitis, the infection presumably spreads through the submucous tissue to the larynx. It is often difficult to determine whether concomitant perichondritis of the laryngeal cartilages exists without exposing the latter. The chief symptoms of laryngeal abscess are voice changes, swelling (internal, external, or both), and tenderness on pressure over the larynx. Dysphagia occurs when the abscess is large. Differential

diagnosis in the child includes diphtheria, lymph node abscess, retropharyngeal abscess, and infected thyroglossal cyst.

Treatment consists of evacuation of the abscess, from the internal approach if the abscess points there. If no internal pointing is present, and there is perichondritis and necrosis of cartilage, an external approach is advisable. Appropriate antibiotics, as determined by culture and sensitivity of organisms, are a useful adjunct. A case of abscess of the larynx in a 4 year old boy treated by internal incision and drainage is reported.

Retropharyngeal abscess is a more common condition of childhood. Fifty per cent of cases occur in the first year of life, and 85 per cent occur in infants under 2 years of age. The retropharyngeal glands atrophy in later childhood, and almost all cases occur in children under 3 years of age. The source of infection lies in the nasopharynx, nose, sinuses or middle ear tract. The predominant infecting organism is the streptococcus. Differential diagnosis must include parapharyngeal abscess, peritonsillar abscess, cervical caries, and congenital cysts. The commonest mistake in diagnosis is faucial diphtheria because of the urgent respiratory symptoms and "bull-neck" appearance. If left alone, the abscess may (1) rupture into the pharynx and cure itself; (2) burrow laterally and point in the anterior triangle; (3) burrow downwards along the prevertebral fascia into the posterior mediastinum; or (4) break into the carotid sheath and erode a blood vessel, usually the internal jugular vein.

Incision and drainage is the treatment of choice. Intraoral incision can be safely carried out with the child properly held in the Rose position and with suction available. A guarded knife should be used. Inhalation anesthesia is dangerous and unnecessary

A case of retropharyngeal abscess in a 12 weeks old male infant treated with incision and drainage is described in detail. Subglottic edema necessitated tracheotomy, and the subglottic edema was very slow to disappear. MALCOLM PLUM, M.D.

**The Natural History of Carotid Body Tumors; Their Diagnosis and Treatment.** R. S. MONRO. *Brit. J. Surg.*, 1950, 37: 445.

Five new cases of carotid body tumors are reported. From these, and 223 other cases reported in the literature, the following is derived.

There is a wide range of age at which this tumor occurs, but the average age is around 34 years; its incidence is equally distributed among males and females, with no apparent hereditary factor. The tumor is usually solitary and slow-growing, with an average history of 7 years, but multiple tumors are recorded and greater or lesser time intervals are not uncommon. In most cases the neoplasm is benign, but it undergoes malignant change in about 12 per cent of cases, usually following local excision. Characteristically it is located at the carotid bifurcation and the external carotid artery can be palpated in front of it. Consistency ranges from extremely soft to fibrous hardness, depending upon the extremely variable histologic appearance. Syncope is rarely associated with the tumor, but to prevent such an occurrence during surgery, a general anesthetic is administered. The most important feature in diagnosis is consideration of the possibility of such a tumor plus palpation of an associated pulsation.

Surgical treatment is attended with an overall mortality of 15 per cent. This leads to a careful evaluation of the benefits of surgery; however, because of the incidence of 12 per cent malignancy, and a 30 per cent mortality associated with exploration and inadequate excision, a much greater justification is present when it is noted that the mortality is only 7.5 per cent with careful dissection and excision, and only 3 per cent when a block dissection, including removal of the carotid bifurcation, is done. However, if surgical cases alone are considered, removal by dissection is attended by a 6.5 per cent mortality as against a 29 per cent mortality for carotid resection, while abandoned operations are fatal in 30 per cent of cases.

The best judgment seems to dictate preparation for a carotid resection by development of a collateral circulation with intermittent and gradual carotid occlusion. In this way, it is believed that if carotid resection is necessary because the tumor cannot be dissected away, it will be attended by a much lower mortality rate. Vein grafts may even be considered in those cases which do not tolerate division of the internal carotid well. Postoperative anticoagulant therapy should be given to prevent development of thrombosis of the vessels that have been manipulated or divided. Radiotherapy may be considered for inoperable cases or cases in which surgery was refused, but this has a very limited effectiveness.

ROBERT L. CRAIG, M.D.

**Laryngeal Carcinoma** (Das Kehlkopf-Karzinom). KARL AMERSBACH. *Neue med. Welt.*, 1950, 1: 632.

Carcinoma of the larynx constitutes about 0.5 to 0.8 per cent of all cases of cancer. Textbooks usually make a distinction between external and internal laryngeal carcinomas, but this classification should be dropped because all carcinomas lying outside the larynx are pharyngeal carcinomas. This is important for the prognosis. While pharyngeal carcinomas, with few exceptions, are frankly malignant, metastasize early, and very often recur after attempts at surgical removal, laryngeal carcinomas present a totally different picture; most often they grow slowly, persist for years without progressing, and metastasize relatively seldom and then very late. They are found mainly on the vocal cords and the laryngeal aspect of the epiglottis, more rarely in other parts. When metastasis does occur, it is usually limited to the regional lymph nodes. In general, metastasis occurs only when the tumor exceeds the aditus laryngis or grows through the wall of the larynx.

Laryngeal carcinoma shows a predilection for men, and appears preponderantly under the form of cornified flat epithelium cancer even where there is

normally no flat epithelium or only an occasional island of it, but basal cell and cylindrical cell cancers and adenocarcinomas are also observed. Early diagnosis is of decisive significance. As long as the tumor, especially that of the vocal cords, remains in the mucosa and has not reached the deeper parts, particularly the motor system, operative removal is possible with relatively little destruction. Despite the fact that many of these tumors have an exceedingly slow growth without formation of metastases, they must be considered as malignant and treated accordingly. Any papilloma in a man from the beginning of the fifth decade must be suspected of being a carcinoma, and extirpated. The only exceptions are those in persons beyond the age of 80 in whom the author does not take any therapeutic measures. The prognosis should, in general, not be too pessimistic, but caution is recommended so as not to be disagreeably surprised by a recurrence.

Therapeutically, the author makes a basic distinction between internal laryngeal carcinoma and the so-called external form, or pharyngeal carcinoma. From 1914 to 1927 he has worked principally with laryngofissure. Since 1927 he has also performed a large number of total extirpations of the larynx and transverse laryngopharyngeal resections according to Gluck, but he has abandoned the latter in recognition of the fact that it is seldom possible to extirpate pharyngeal carcinoma. He has only his statistics for 1939 through 1948, but the results correspond largely to those of previous years. He has had no operative or immediate postoperative mortality. In 80 per cent of the cases of thyreotomy, he has obtained a cure of over 3 years. The number of recurrences amounted to 15 per cent; these were treated by roentgen or radium irradiation, but none of the patients could be saved, and their life was not actually prolonged either. Only true recurrences were irradiated, and no prophylactic postoperative irradiation was attempted. Among 9 laryngectomies performed during the period from 1939 through 1948, there were 3 recurrences; 6 had none. In the oldest of these cases, the patient is still living after 10 years. RICHARD KEMEL, M.D.

**The Effect of Varying Quantities of Inorganic Iodide (Carrier) on the Urinary Excretion and Thyroidal Accumulation of Radioiodine in Exophthalmic Goiter.** DONALD S. CHILDS, JR., F. RAYMOND KEATING, JR., J. EDWARD BALL, MARVIN M. D. WILLIAMS, and MARSCHELLE H. POWER. *J. Clin. Invest.*, 1950, 29: 726.

An ideal tracer experiment may be defined as one in which the quantity of the labeled material added to the organism is too small to increase significantly the total quantity of the material which is already present within the body, and therefore is incapable of altering the metabolic equilibriums being studied. From this point of view an ideal tracer dose of $I^{131}$ in studies of thyroid physiology in man would be one which was carrier-free (that is, containing no added $I^{127}$) and which contained the smallest quantity of radioactivity which the nature of the experiment and sensitivity of the apparatus would permit.

Several investigators of thyroid function in the human have employed carrier-free doses of $I^{131}$, usually in a dose of 100 microcuries. This quantity of radioiodine represents an extraordinarily minute amount of the element by weight ($8.1 \times 10^{-4}$ microgram) and, dissolved in 100 c.c. of water, represents a $6.2 \times 10^{-11}$ molar solution. Because of concern over the possibility of significant losses by adsorption on glass surfaces from such extremely dilute solutions, the authors have preferred to employ for "tracer" doses 100 microcuries of $I^{131}$ mixed with 0.1 mgm. of stable iodide ($I^{127}$) $= 7.7 \times 10^{-7}$ molar solution. Such a dose falls short of the ideal conditions for a tracer study in that it does increase to an appreciable extent the total store of inorganic iodide in the body. It has the virtue of having approximately the magnitude of the minimal daily dietary increment of iodide and for this reason it was hoped that it would not alter significantly the biologic equilibriums being investigated. The investigation was originally undertaken to evaluate this practical question: to what extent does carrier iodide affect the results of radioiodine studies in exophthalmic goiter? The results which have been observed throw light on several important aspects of thyroid function and raise a number of issues beyond the scope of the original question.

The method employed was that of comparing successive tracer tests in the same subject, employing for each tracer different quantities of stable carrier iodide ($I^{127}$). Such studies ideally should be carried out on normal or euthyroid subjects as well as on hyperthyroid ones. However, because of the possibility of some eventual deleterious effect on the thyroid gland resulting from the cumulative radiation of multiple tracer doses, multiple doses were not given to euthyroid persons. Instead, patients with exophthalmic goiter were used who, for clinical reasons, had been selected for treatment with large doses of radioiodine. In these individuals, a series of successive tracer studies preceding radioiodine therapy was not regarded as hazardous. Patients with exophthalmic goiter proved particularly suitable subjects for this investigation because their thyroidal function appears sensitive to small quantities of iodine and also because the marked increase in the iodine-accumulating function of the thyroid which they exhibited made it easier to show significant changes than would be the case with euthyroid persons.

Patients who had not been recently treated with antithyroid drugs or with iodine in any form were selected for study. Tracer doses were given at intervals of 5 days. In each instance the dose was given to the patient in the morning, breakfast being withheld. The urine was collected and its radioiodide content was measured. In some instances specimens of blood were withdrawn at various intervals and analyzed for radioactivity.

In vivo observations were made by two methods: (1) frequent serial observations anterior to the thy-

roid were made with a Geiger counter for several days; (2) measurement of the absolute quantity of radioiodine in the thyroid was made 2 or more times during each study.

In certain instances, $I^{131}$ was administered intravenously. The material to be given was diluted with physiologic saline solution, sealed in a glass syringe encased in a specially constructed lucite shield 1 cm. thick. While such a shield affords little protection against the penetrating gamma rays of $I^{131}$ it was felt that it materially lessened the radiation hazard to the operator by increasing the distance of the gloved fingers from the source of radiation. By working efficiently and quickly, and performing no more than two such procedures a week, it was estimated that the total exposure to the fingers never exceeded and seldom approached the maximal permissible dose of 0.3 rep (roentgens-equivalent-physical) per week.

The renal clearance or renal excretion rate of iodide in patients with exophthalmic goiter was not significantly altered by variations in the quantity of stable (carrier) iodide in the range of 0 to 2.0 gm.

The relative iodine-accumulating function of the thyroid in patients with exophthalmic goiter was not significantly altered in most instances by increasing the amount of stable carrier from 0 to 0.1 mgm. Quantities of carrier of more than 0.1 mgm. significantly reduced the relative iodine-accumulating function as measured by extrarenal disposal rate. Quantities of carrier iodide of the order of 1 mgm. reduced extrarenal disposal rate to euthyroid proportions in the majorty of instances; 10 mgm. or more of carrier in most cases reduced it to negligible proportions.

After doses containing carrier iodide, in the range 0.001 to 0.1 mgm., in vivo observations show that $I^{131}$ progressively accumulates in the thyroid in a fairly smooth exponential curve. After doses of 10.0 mgm. or more of carrier iodide, the curve of thyroidal $I^{131}$ rises rapidly to a peak in 2 to 3 hours, and thereafter decreases rapidly in amount, paralleling the fall of radioactivity in serum. Doses containing carrier iodide between 0.1 and 10.0 mgm. result in curves which appear to be intermediate between these extremes.

The thyroidal function portrayed with the use of small quantities of carrier iodide (0.1 mgm. or less) is considered to be predominantly the utilization of iodine in the biosynthesis of thyroid hormone. The thyroidal function disclosed with the use of large doses of carrier iodide is considered to be the concentration of inorganic iodide within the thyroid, called the iodide-trapping or iodide-concentrating function.

The relative biosynthetic function appears to be suppressed by doses of iodide in excess of 0.1 mgm. in subjects with exophthalmic goiter. In these subjects, the iodide-trapping function may not appear to be altered with doses in the range 0.1 to 100 mgm. but may appear to be suppressed by doses of 500 mgm. or more. The relative biosynthetic function appears to be suppressed or obscured at a serum concentration of inorganic iodide of the order of 5 micrograms per 100 c.c. or less; the capacity of the trapping function appears to be exceeded at serum concentrations of inorganic iodide of the order of 2 mgm. per 100 c.c.

The iodide-trapping function of the thyroid can be evaluated in the human subject following high-carrier doses by comparison of the quantity of radioiodine in the thyroid with the concentration in the serum at the same time. The mean ratio of thyroidal content to serum concentration in 7 cases of exophthalmic goiter tested disclosed a mean thyroidal iodide space of 9.5 liters. The method here employed was not found suitable for accurate evaluation of the thyroidal iodide-trapping mechanism in euthyroid patients, which appears to be of the order of 1 liter, or less.

**Metastatic Hypernephroma of the Thyroid Gland with Subsequent Thyroidectomy, Nephrectomy, and Resection of Pulmonary Metastases.** GEORGE E. MOORE and W. W. WALKER. *Surgery*, 1950, 27: 929.

The present case is the seventeenth case appearing in the literature of a renal cell carcinoma which had metastasized to the thyroid gland. This is in addition to the case of a metastatic adrenal carcinoma reported by Boys. In only one previous case was the primary lesion removed after thyroidectomy disclosed metastatic hypernephroma. The extended period of palliation that was obtained in Pemberton's case (10 years) certainly would seem to justify removal of the primary tumor.

The preferential growth of metastases in various organs has been discussed many times. The occurrence of multiple metastases in the thyroid would indicate that probably many organs received tumor emboli, but that only under the most favorable conditions did they grow. In the authors' case, a group of pulmonary metastases suddenly enlarged enough to be detected by roentgen examination 1 year after the metastases to the thyroid had been resected, and 4 months after the primary lesion had been removed. Apropos are the cases cited previously in which thyroid metastases were present many years before or after similar phenomena affected other organs. The second case reported by Pemberton is an unusual example of this process.

Thus, the disclosure of metastatic hypernephroma of the thyroid with no other obvious metastases should not deter the surgeon from attempted removal of the primary tumor. The natural history of hypernephroma is such that prolonged palliation, survival, and perhaps even cures may result from aggressive surgical therapy. This patient expired 2½ years after the first operation with metastatic lesion of the brain. JOHN J. MALONEY, M.D.

**Cancer of the Thyroid: 10 to 20 Year Follow-Up.** HUGH F. HARE and FERDINAND A. SALZMAN. *Am. J. Roentg.*, 1950, 63: 881.

The authors present the pertinent findings in a series of 198 patients in whom the diagnosis of cancer

of the thyroid was made prior to 1936 and whose subsequent course was followed. All cases were reclassified, after review and study, into the classification of Warren and Meissner.

Cancer of the thyroid may appear at any age, but the more rapidly growing types of tumor occur more often in those past 50 years of age. In this series the ratio of females to males was 170 to 28. The malignant tumor arises in a pre-existing tumor of the thyroid. In the patients of this series, single thyroid nodules were malignant in 10 per cent of those coming to operation. Because the clinical findings of early thyroid cancer are so similar to those of thyroiditis and single adenoma, a malignancy cannot be excluded without biopsy and historical evaluation. Associated hyperthyroidism is rare in cancer of the thyroid gland. In this series it was found in 16 patients, an incidence of approximately 8 per cent.

The 10 to 20 year follow-up showed that good results were obtained in treating alveolar adenoma with malignant change (which, though histologically a cancer, is not clinically malignant), papillary adenocystoma with invasion, and papillary adenocarcinoma. In the treatment of alveolar adenocarcinoma and giant cell carcinoma, results were poor. It was believed that treatment of the small cell cancer failed because the lesion had infiltrated widely by the time the patient sought treatment.

The treatment of choice in all but the alveolar adenoma, malignant, (where excision alone suffices) is radical surgery followed by roentgen therapy. Controlling the growth of papillary adenocystoma with invasion, papillary adenocarcinoma, and small cell carcinoma will require the use of a tumor dose of 4,800 to 6,000 roentgens. Radium is useful in the treatment of residual and infiltrative tumors, particularly alveolar adenocarcinoma. At least 6,000 gamma roentgens should be given to the periphery of the tumor.

The authors' experience with radioactive iodine has been that it should be most effective in papillary adenocystoma (malignant), and the papillary adenocarcinoma. In the alveolar type of adenocarcinoma, the cells may be more anaplastic and therefore require other types of radiation.

BENJAMIN F. LOUNSBURY, M.D.

# SURGERY OF THE NERVOUS SYSTEM

## BRAIN AND ITS COVERINGS; CRANIAL NERVES

**Diagnosis of Intracranial Lesions by Vestibular Tests.** FERNANDO G. SANTAMARINA. *Arch. Otolar.*, Chic., 1950, 51: 831.

Thirty patients with intracranial lesions confirmed either at operation or at autopsy were studied with vestibular tests preoperatively. The author presents the case protocols showing the degree of correlation between the results of the vestibular tests and the operative findings. Preliminary work-up included a history and a complete otolaryngological examination.

The vestibular studies were divided into two major classifications: (1) spontaneous phenomena and (2) caloric or rotation tests. Spontaneous phenomena included testing for spontaneous nystagmus, postural nystagmus, spontaneous vertigo, tendency toward falling, and spontaneous past pointing. The features for differentiation between spontaneous and ocular nystagmus are listed. A table is also presented which includes the spontaneous findings and indicates that they were of some value in distinguishing between peripheral and central types of lesions. In vestibular testing, the mass caloric irrigation test was used, whenever possible, as the procedure of choice, but occasionally the rotation test was performed when the caloric test was contraindicated, as in cases with recent tympanic membrane perforations. The mass caloric irrigation test with cold water was regarded as the better test because each ear could be stimulated and examined separately, and the vertical and horizontal canals could be studied individually. The technique of this test is described in detail.

In interpreting vestibular tests a central lesion was suspected: (1) if "central spontaneous findings" were present; (2) if after vestibular stimulation instead of normal nystagmus there was perverted, inverted, mixed, exaggerated nystagmus, or nystagmoid movements; (3) if normal responses were secured from canals in one plane and either no response or an abnormal one from canals of the other plane; (4) if a persistent and definite past pointing was present spontaneously and was not attended by vestibular stimulation; (5) if nystagmus was present but vertigo or past pointing was absent, or if the situation was reversed; (6) if dissociated nystagmus was seen.

On the basis of the vestibular tests the author has divided the lesions into these main groups: the "infratentorial" (used by the author as being exclusive of cerebellopontine angle lesions), the supratentorial, and the cerebellopontine angle. The localization of the 10 infratentorial lesions was relatively good, but in the 13 supratentorial ones the responses to vestibular tests were of less diagnostic value. In most of the latter group the lesion could be localized above the tentorium with some suggestion as to whether it inclined toward the right or left side. Practically all 7 patients with cerebellopontine angle lesions had a typical Bárány pattern of acoustic neuroma on vestibular testing.

The author emphasizes that vestibular tests are of importance in the diagnosis of intracranial lesions, but they are merely an adjunct to complete roentgenological studies and careful neurological examinations. RICHARD C. SCHNEIDER, M.D.

**A Study of Certain Forms of Psychomotor Agitation Present in Epilepsy and Mental Retardation, and Their Treatment by Bilateral Anterior Pericallosal Topectomy** (Étude de certaines formes d'agitation psychomotrice au cours de l'épilepsie et de l'arriération mentale, traitées par la topectomie peri-calleuse antérieure bilatérale). J. Le BEAU and J. PECKER. *Sem. hop. Paris*, 1950, 26: 1536.

On the basis of experimental observations by Bard, Ward, Mountcastle, McCulloch, and others, the authors thought that the resection of Brodmann's areas 24 and 32 might improve psychomotor behavior disturbances. They operated on 8 young patients who had had attacks of violent rage or destructive agitation complicating epilepsy or childhood encephalopathies. They report the preoperative and postoperative neurologic and psychologic findings, and the social behavior in 1 case of hypomanic postencephalitic syndrome, 2 cases of epilepsy, and 5 cases of mental retardation with psychomotor disturbances. No postoperative intellectual deterioration was observed in these patients, and slight improvement of mental and social status could be noticed in 3 cases. It was more difficult to evaluate the practical effects of the operation on the agitation and the violence of the patients. Most of them showed good results immediately after the operation, but improvement was only temporary. In several of the patients the intervention was recent and the follow-up period was too short.

The authors conclude that their results consisted mainly in a diminution of the number of severe attacks of violence, and of the permanent agitation, and they report some improvement in the character of the patients. They also describe in detail their operative technique which consists of a right frontal osteoplastic craniotomy, exposing the superior longitudinal sinus and the anterior portion of the corpus callosum. GEORGE PERRET, M.D.

**Cerebrospinal Fluid in 302 Cases of Intracranial Tumor, Abscess, and Subdural Haematoma.** W. R. HENDERSON and C. G. DE GUTIÉRREZ-MAHONEY. *Brit. M. J.*, 1950, 1: 1461.

The diagnostic spinal puncture should not be considered as a part of the routine neurologic exam-

ination, and especially in cases of suspected space-occupying lesions. This would apply particularly to the physician, as the neurosurgeon and neurologist, by reason of their greater experience in these cases, recognize its limitation and dangers.

There is comparatively little accurate study of any possible value that might be obtained from spinal punctures in cases of suspected space-occupying lesions. The authors have carefully studied and analyzed the cerebrospinal fluid findings in 302 consecutive cases of verified intracranial tumors, abscesses, and hematomas seen at the National Hospital, Queens' Square, London.

It is pointed out that such an ancillary study is used more often than is necessary. There are, however, two specific lesions which give findings that are consistent enough to give a presumptive diagnosis. The finding of a deep yellow fluid with high protein content and moderate pleocytosis might be indicative of a glioblastoma invading the wall of a ventricle. Although metastatic lesions frequently give the first two of these findings, they did not usually contain the pleocytosis. Acoustic neurofibromas always produce a high protein content and it is believed, therefore, that in a suspected cerebellopontine angle tumor the finding of a normal protein content would rule out such a lesion. Although there were no other definite consistent findings of diagnostic value, meningiomas as a whole gave a somewhat higher protein content than did the gliomas. Interestingly enough, the authors' findings reveal that the spinal fluid findings were of very little value in the diagnosis of brain abscesses.

The examination of ventricular fluid was of such little value that the authors feel that such a study is not worth while.

It is stressed that lumbar puncture is unnecessary and dangerous in the presence of papilledema. Although this is well recognized by neurosurgeons, it is still not as widely known as it should be. An important point in the study of cerebrospinal fluid pressures is the correct positioning of the patient. Although the patient may be markedly flexed at the time of inserting the needle, the knees and head should be completely relaxed at the time the pressure is read. Undue importance should not be attached to the spinal fluid pressure as conclusive evidence for or against an intracranial expanding lesion, since, as is well known, the pressure may be high without the finding of papilledema and, conversely, may be temporarily normal even in the presence of papilledema.

JACK I. WOOLF, M.D.

**The Treatment of Otogenic Brain Abscesses.** J. A. HARPMAN. *J. Lar. Otol.*, Lond., 1950, 65: 319.

The author has presented methods of treatment of otogenic brain abscesses as evolved from a study of 18 patients treated at the Warwick Hospital since 1941. Of the first 8 patients, 7 died and 1 recovered; however, of the last 10 patients, 9 recovered and 1 died. Although it is stated that the two series of cases were treated differently, these differences are not specified. It is to be surmised that the advent of the antibiotics was of prime importance.

The article is written largely from the otolaryngologists' point of view, and would differ in detail from the current neurosurgical point of view. This pertains particularly to surgical procedures. It is stressed that surgery should be performed as soon as the diagnosis is made.

The author believes that "it is advisable, in cases of otogenic brain abscesses, to perform the surgery required by the aural lesion before operating on the brain." However, from a review of the cases presented, it is obvious that he usually operates upon both and usually through the mastoidectomy approach. Only in cases in which the abscess cannot be reached from this approach, or in which there is great doubt, is a separate approach made through the temporal or occipital bone.

The endaural antauricular mastoidectomy is advocated as the operative procedure of choice. From pictures presented, it can readily be seen that this procedure would be more applicable in temporal lobe abscesses; however, it appears that the drainage of a cerebellar abscess would be somewhat difficult. The operative procedure is well described. Although descriptions are also given of the more commonly considered neurosurgical approaches for such abscesses, these descriptions pertain more to the superficial approach. There is considerable reference to the literature on brain abscesses.

An important point is that some patients had postoperative headaches, vomiting, and bradycardia, due to dehydration from the loss of fluid rather than to an increase in the intracranial pressure. The restoration of body fluids and electrolytes resulted in rapid recovery.

JACK I. WOOLF, M.D.

**Discussion on Current Trends in the Management of Gliomas.** JOE PENNYBACKER, D. W. C. NORTHFIELD, GERALD PARSONS SMITH, and G. K. TUTTON. *Proc. R. Soc. M.*, Lond., 1950, 43: 329.

The authors discuss current trends in the management of gliomas, and each author reports some of his experiences with this group of brain tumors.

PENNYBACKER states that his material consisted of 716 cases of verified gliomas of the brain dealt with in the Nuffield Department of Surgery in Oxford, during the past 11 years. The various types of intracranial gliomas are enumerated: cerebellar astrocytoma, ependymoma, medulloblastoma, spongioblastoma multiforme, astrocytomas of the cerebrum, oligodendroglioma, and unclassified gliomas. Approximately 9 per cent of these tumors are reasonably benign; these are the cerebellar astrocytomas and ependymomas. In commenting on the cerebellar astrocytomas, the author stated that if this tumor occurs in childhood and if it is completely removed, the chances for longevity are very good. He stated that 25 per cent of cerebellar astrocytomas were found to involve the brain stem at the time of surgery and this, of course, adds considerably to the mortality.

He also stresses the point that all lesions causing hydrocephalus should be verified if at all possible. There is a current vogue for easy short-circuiting procedures such as ventriculocisternostomy and ventriculostomy for hydrocephalus, and remediable lesions may be missed if care is not taken to be certain just what is causing the hydrocephalus. He discusses at some length a case of an ependymoma occupying the fourth ventricle. An anterior ventriculostomy was performed as a palliative procedure, and subsequently a large cystic and solid astrocytoma of the vermis was found at postmortem examination.

In discussing the medulloblastoma, PENNYBACKER stated that the picture was one of unmitigated gloom. He discusses some of the results obtained by other neurosurgeons. The results are uniformly bad.

He next discusses the spongioblastoma multiforme group. These tumors are by far the most common and account for about 80 per cent of all gliomas. He presents a table showing the mortality, morbidity, and survival rates. Of 282 patients with spongioblastoma multiforme, who were operated upon, 110 died in the hospital. Eighty-three patients survived the procedures involved in verifying the lesion—and in this connection he states that arteriography and burr-hole biopsy seem to be a good deal less lethal than ventriculography and biopsy. In his entire material, there were only 30 cases of useful survival following surgery for spongioblastoma multiforme; 18 of these patients survived usefully for periods up to 6 months, 3 for 9 months, 3 for 12 months, 2 for 24 months, 1 each for 30 and 33 months, 1 for 48 months, and 1 for 55 months.

The general trend of these figures has been apparent for several years and, to be realistic about these tumors in the present state of our hospital services, the most important thing about them is histologic verification. This means a biopsy after accurate localization by arteriography or ventriculography. In cases in which there is already profound disability such as aphasia, hemiplegia, or mental derangement, and in which the diagnosis of spongioblastoma multiforme is proved histologically, the author states that surgery has nothing to offer.

NORTHFIELD discussed the groups of gliomas which were studied by him from 1939 to 1944. There were 58 cases of spongioblastoma multiforme in which a follow-up was available. Many of these patients died in the hospital without major craniotomy, although some diagnostic measure was usually employed in order to confirm the diagnosis.

He next discusses cases of cerebral astrocytoma. A graphic representation of the length of history in years, before the operation, and of postoperative survival is given. It is interesting to note that the patients who survived the longest also had the longest history. This, of course, has been generally well known. In other words, the patients with long preoperative histories are usually those with long postoperative survival.

NORTHFIELD stresses the point that invasion by tumor does not necessarily mean destruction of the nervous tissue. Invasion can occur with, and without, destruction. This is of great clinical importance in the natural history or the biology of the slow-growing astrocytoma and oligodendroglioma. The tumor may be present for many years, perhaps causing epilepsy, but no significant neurological deficit. Such patients may ultimately need operation for the relief of raised intracranial pressure and the evacuation of cysts, and partial removal of the tumor may provide a useful internal decompression, but the surgeon cannot hope to do more.

The present practice in the treatment of gliomas is, first, an attempt at a pathologic diagnosis. This may often be suspected from the clinical picture, and angiography may give valuable help. Clearly, when there is doubt between a glioblastoma and a meningioma, the old-fashioned method of placing greater reliance on clinical judgment than on ancillary methods will usually lead to exploration.

It is his belief that cerebral astrocytoma should at present be regarded as being irremovable in most patients. He stresses the importance and role of the radiologist in the treatment of these malignant growths.

SMITH discusses the role of the electroencephalogram in the diagnosis of the cerebral glioma.

TUTTON discusses his experiences with 100 cases of glioma in the cerebral hemispheres, seen on the Neurosurgical Service, in Manchester, during the past 18 months.

In his experience chronic subdural hematoma and cerebral abscess can nearly always be diagnosed by the electroencephalogram. He stresses the importance of angiography in the diagnosis and localization of brain tumors. He states that the number of ventriculograms have fallen off by nearly one-third since use of the percutaneous angiogram.

H. H. LANDER, M.D.

**Ganglioneuroma of the Nodose Ganglion of the Vagus.** RICHARD C. CLAY. *Ann. Surg.*, 1950, 132: 147.

Ganglioneuroma is the most highly differentiated tumor of neurogenic origin. It is a rare tumor and its appearance in the neck has been reported in less than 20 cases.

The case report concerns a 2½ year old child who, at the age of 8 months, developed a swelling in the neck following fever and cough. During the ensuing 2 years the lump did not change in size except during the last month before admission. The swelling was not tender, and displaced the left carotid artery to the left and the trachea to the right. The tumor was exposed by cutting the sternocleidomastoid muscle. Further investigation showed that the lesion arose from the vagus nerve in the region of the ganglion nodosum. The tumor was removed and end-to-end anastomosis was made of the nerve.

Microscopic examination showed nerve bundles and large mature ganglion cells.

Section of the vagus nerve led to left vocal cord paralysis, but neither injection into the nerve at operation nor cutting it led to any change in cardiorespiratory function. There was some postoperative tachycardia for 4 days. A Horner's syndrome appeared after operation.

The child was observed for 9 months, but during that time there was no evidence of recovery of the vagus nerve despite the nerve anastomosis.

ADRIEN VER BRUGGHEN, M.D.

## SPINAL CORD AND ITS COVERINGS

**Surgical Treatment of Closed Trauma of the Spine, with Disturbances of Spinal Cord Functions** (Trattamento curento dei traumi chiusi del rachide, con turbe midollari). CARLO PAIS. *Chir org. movim.*, 1950, 34: 79.

In addition to a study of the literature, the material which forms the basis for this discussion stems from the Rissoli Orthopedic Institute of the University of Bologna, Italy. Here they are neither systematic interventionists, nor systematic abstentionists; that is, they belong to that group of neurosurgeons who prefer to give the patient a chance to recover by orthopedic immobilization and extension without resorting to an immediate operative procedure. However, the operation of laminectomy is regarded as a procedure which complements orthopedic reduction and retention.

The patient, immediately after the trauma, should receive a careful examination and then, as soon as the condition of shock—general, and particularly medullary shock—will permit, he should be encased in an orthopedic cast or a cast with extension. The patient is then observed for any change in the findings (roentgenologic, including stereoscopy; neurologic; lumbar puncture; the test of Queckenstedt and Stookey; and myelography), long enough to be sure that the residual signs of cord compression are of a permanent, unvarying character (bone fragment, disc herniation) before resorting to open operation.

As a rule, one does not intervene in those cases in which the clinical findings change from time to time, or in which the Queckenstedt-Stookey, or the myelographic examination indicates that the spinal canal is not entirely occluded. If the paralytic manifestations show any tendency toward a spastic character, the cord is considered to be intact; thus, such finding may prove to be an indication for, or contraindication to, laminectomy.

At the Rissoli Institute the laminectomy is done through an opening in the cast and, if possible, the form of extension used is continued during the entire time of the operation. The presence of decubitus sores do not contraindicate operation, especially at the present time, with the possibilities offered by the sulfonamides and penicillin. The level at which the lesion is located has little effect on the indications for operation; however, the higher the lesion, the more grave the prognosis. Most dangerous is the suboccipital laminectomy. In the lower cervical portion of the cord, and in the thoracic and lumbar portions, there are no particular limitations; especially in the lumbar region is the great power of recuperation of the cauda equina particularly reassuring. It must be remembered, however, that the thoracic and lumbar bulbous sections of the cord are particularly sensitive to the trauma of accident or of operation, and in these portions the surgeon will be especially careful in his manipulations.

The optimistic abstentionism in some quarters with regard to transverse fractures is not shared, and a case is illustrated wherein the fragment of arch was displaced into the bony canal of the spine and had to be removed.

When surgical intervention is indicated, the age of the patient is not a decisive factor in placing the indications; however, in very old subjects such indication is exceptional because of the diminished powers of recuperation of the cord as a result of the sclerosis of the blood vessels and of the cord tissues generally.

Despite the fact that in the usual laminectomy, even one of extensive proportions, the spinal column (in association with the resultant scar tissue and tendency to fusion of the articulations of the spinous processes) will retain a sufficient supportive function, in a few instances a laminectomy-arthrodesis may be indicated. This is sometimes the case in rare suboccipital laminectomies, those at the level of the most mobile portion of the cervical spinal column, those at the dorsolumbar junction, or fractures anywhere showing a tendency to displacement of the fragments. In such cases preference is for detachment of the posterior bony and ligamentous structures in the form of a temporary flap, the insertion of a tibial transplant, and then replacement over this implant of the temporary flap. This is the technique which was described in 1932, by Delchef.

At the Rissoli Institute, the total experience with early laminectomy has been 25 cases. Two patients recovered, 12 were improved, 7 were without improvement, and 4 died. The operation is not approached with the feeling that "there is nothing to lose and everything to gain." The operation is in itself a major traumatic experience and may easily cause an increase in the already threatening edema and hemorrhage. However, it is true that when the operation is properly carried out and done at the proper moment, better results are obtained. The mortality today is much lower than formerly and the surgeon, although perhaps not entirely convinced of the utility of the procedure in the particular instance, may nevertheless have to accede to the insistence of the patient and of the patient's kinfolk, who are apt to adopt the attitude that anything is better than to remain a paraplegic.

In cases in which the patient must remain a paraplegic, certain complementary procedures will come under consideration. For the combination of spastic paralysis and intractable pain, the posterior radiculotomy of Foerster and Codivilla is preferred. For the exclusively spastic form, a posterolateral or

posteromedial cordotomy is performed. For the exclusively painful syndromes, the type of operation preferred is the anterolateral cordotomy, or the posterior commissural myelotomy of Leriche.

In the matter of the attempts of Chiasserini and others to implant the intercostal and other nerve trunks in the cord below the level of the lesion, the author believes that the procedure is still in the experimental stage; nevertheless he regards such an attempt as justified in those patients who have not otherwise shown any amelioration of their condition.

Urinary bladder retentions are treated by catheterization rather than by suprapubic cystotomy, which is apt to prove troublesome in a patient who must be constantly changed as regards body posture in order to avoid bed sores. Amputation or exarticulation of the lower extremities would only be indicated in those exceptional instances in which the added weight of the spastic extremities is threatening the life of the patient (bed sores). Periarterial sympathectomy is indicated only in rare cases of residual trophic disturbances Tracheotomy for pharyngeal compression in cervical fracture has been reported in only one case, by Sonnemberg.

JOHN W. BRENNAN, M.D.

**Surgical Consideration of Intraspinal Tumors.** ALFRED W. ADSON. *J. Internat. Coll. Surgeons*, 1950, 14: 1.

One cannot overemphasize the importance of an early diagnosis of intraspinal lesions, since most of them are benign and are amenable to surgical treatment. Tumors originating from the meninges, nerve roots, blood vessels, and supporting tissues of the spinal column outnumber those originating within the spinal cord by a rate of 4 to 1. Recognition and removal of protrusions from intervertebral discs have likewise increased the field of spinal surgery.

In the complete paper the author discussed the symptoms, differential diagnosis, and essential types of examination relative to intraspinal tumors.

A review of intraspinal tumors at the Mayo Clinic showed that 29 per cent were neurofibromas, 25 per cent were meningiomas, 8.5 per cent were hemangioendotheliomas, 6 per cent were miscellaneous extramedullary tumors, 6 per cent were ependymomas that developed in the filum terminale, 11.5 per cent were intramedullary tumors, 10 per cent were sarcomas, and 4 per cent were chordomas.

Neurofibromas may arise from the nerve roots within the dura, from the roots as they penetrate the dura, or from the peripheral nerves just lateral to the dura. These lesions may be situated wholly within the spinal canal, may protrude into the intervertebral foramen, or may present the typical dumbbell appearance, with one portion within the spinal canal and the other beyond the intervertebral foramen. Neurofibromas situated in the spinal canal, even though they have eroded the bone around the intervertebral foramen, usually can be removed during a one-stage operation. Those which are dumbbell in shape and are situated in the cervical region are more effectively removed through two separate incisions. The extraspinal portion of such a tumor is removed first through a lateral cervical incision. This is followed by laminectomy, frequently hemilaminectomy, through which the intraspinal portion of the tumor is removed.

Meningiomas, fibroblastomas originating from the arachnoid, may be situated in any portion of the spinal canal and be located in any part of the circumference of the canal about the spinal cord, producing pressure at the point of origin. Usually it is possible to remove the tumor mass *in toto* but in doing so, it is necessary to remove a portion of the arachnoid and dura, since they are intimately attached to the tumor at the site of origin. If the surgeon fails to do this, recurrence will develop.

After the removal of meningiomas and neurofibromas, the surgeon frequently observes marked indentations of the spinal cord. These indentations may have compressed the spinal cord to less than half its normal size, but it also has been observed that even though the indentation has markedly flattened the spinal cord, complete recovery of the patient will take place if the blood supply of the spinal cord has not been destroyed.

The surgical consideration of intramedullary tumors is similar for the entire group, even though they vary in their pathologic classification.

Ependymomas originating within the filum terminale, or even as high as the tip of the conus medullaris, represent a rather interesting group of tumors, since they may grow to considerable size, filling the lumbar and sacral canals before they produce paraplegia. The surgical problem that faces one, then, is to perform an extensive laminectomy in order to uncover the tumor thoroughly, and then proceed with careful dissection and removal of the tumor without impairing the blood supply of the nerve roots, or damaging them. Complete removal will result in a cure; failure to remove the tumor completely will result in recurrence.

Under the heading of vascular tumors the author includes hemangiomas and hemangioendotheliomas. These may be situated extradurally, intradurally but extramedullarily, or intramedullarily. They are usually benign and are fairly well encapsulated, but are extremely vascular. The extradural lesions are flattened, elongated masses, whereas the intradural lesions are usually oval in appearance. The vascular tumors are usually operable, but extreme care is necessary in removing the tumor in order to avoid injury to the blood supply of the spinal cord.

Chordomas originate from the notochord. They are primary malignant tumors but, since their growth is slow and is accompanied by pain, the surgeon is frequently justified in attempting radical removal. After radical resection of these tumors, roentgen therapy appears to offer additional relief in controlling the growth of the tumor and in retarding the process of recurrence.

Other types of lesions discussed were lesions of bone which produce compression of the spinal cord,

foreign-body giant-cell tumors, myelomas, osteogenic sarcomas, osteochondromas, and metastatic lesions of the spinal column. Also considered were surgical procedures in the treatment of Paget's disease, hypertrophic arthritis and osteitis, Hodgkin's disease, and protruded intervertebral disc. The author re-emphasizes the importance of an early diagnosis of intraspinal tumors, since so many of them are benign and are operable. Eighty per cent of the lesions are removable. Complete recovery can be obtained if the tumors are removed before irreparable damage to the spinal cord has resulted.

**Results of Myelographies with Water Soluble Media.** CARL-ERIK JOHANSON. *Acta chir. scand.*, 1950, 99: 560.

This article concerns myelographic studies of 204 cases of suspected herniation of lumbar discs. The material is from the Surgical University Clinics at Helsingfors, Finland. In the preamble, the suggestion is made that pantopaque has been found to be somewhat unsatisfactory on account of complications; these are not specified. Abrodil (20 per cent) or corresponding agents are used, and novocain with the addition of adrenalin is the anesthetic. There is no indication as to how these substances are employed.

Positive myelograms were obtained in 146 patients; of these, 111 were operated upon. The operations were performed by 18 different surgeons. Negative myelograms were obtained in 58 cases.

The main theme appears to be that myelography should not be used indiscriminately and should only be done at the hospital in which the operative procedure is likely to be carried out. It is stated that myelography proved correct in 90 per cent of cases examined, whereas neurologic examination produced correct results in only 60 per cent.

The bibliography is adequate, but does not indicate the part of the text to which it refers.

ADRIEN VER BRUGGHEN, M.D.

## PERIPHERAL NERVES

**Treatment of Erb's Progressive Muscular Dystrophy by Resection of the Carotid Sinus Nerves** (Die Behandlung der Erbschen progressiven Muskeldystrophie durch Resektion der Karotis-Sinus-Nerven). HUGO MEURER. *Deut. med. Wschr.*, 1950, 75: 753.

This very interesting article sheds an entirely new light on the pathogenesis and treatment of progressive muscular dystrophy. The author presents the hypothesis that the disease is caused by disturbances in the regulatory functions of the hypothalamic centers, and that definite improvement can be accomplished by enervation of the carotid sinus nerves.

Histologic and physiologic researches have shown that not only the smooth, but also the striate muscles are supplied by sympathetic and parasympathetic extrapyramidal fibers regulating the trophicity and the acetylcholine metabolism of the muscle.

Furthermore, researches made in the last few years have revealed that disturbances of the diencephalon cause characteristic pictures in a number of tests. These are especially the glucose tolerance, blood sugar level after insulin and adrenalin injection, leucocyte curve after adrenalin, water concentration after thyroxin and hypophysin.

The author was able to show that in most cases of muscular dystrophy these tests gave pictures typical of lesions of the diencephalon. To state one example: in the glucose tolerance test, the blood sugar dropped after ingestion of 80 gm. of glucose to 50 mgm. per cent, and rose to the normal level only after several hours. Similar paradoxical curves were observed in the water concentration and dilution tests under the influence of thyroxin and hypophysin. Injection of adrenalin caused a drop rather than an increase of blood pressure in patients with progressive muscular dystrophy.

From these and other observations, the author concluded that dysfunction of the midbrain centers cause, via the autonomic fibers, too rapid destruction of acetylcholine by cholinesterase, and so produce the syndrome of progressive muscular dystrophy. As the carotid sinus nerves are considered as a relay station of the autonomic system, he tried to influence the disease by bilateral enervation.

The results of this treatment were impressive. The operation was performed in a series of 17 patients, 5 of whom were children. Beginning at the third week after the operation, a definite increase in muscular strength developed. The affected muscles increased in circumference by several centimeters, within 3 to 5 months. This was true also of muscles that could not be exercised because of ankylosis of the joints. Patients who, before the intervention, had waddled along laboriously and had frequently fallen down were able after 2 months to walk up several flights of stairs without help.

Parallel with this clinical improvement, the laboratory tests mentioned reverted to normal. The influence of adrenalin on the blood pressure as well as the water concentration tests became normal after 2 weeks, whereas it took about 8 weeks after the injection of insulin and adrenalin, for the glucose tolerance and blood sugar curve to show the normal picture.

All of the author's patients were operated upon less than a year prior to this article and as yet nothing can be stated about the further development and final outcome of the cases; however, in view of the hitherto hopeless prognosis of the disease, the early results would indicate great progress in the treatment of this disease.

WERNER M. SOLMITZ, M.D.

**Brachial Neuralgia.** W. M. PHILIP. *Brit. M. J.*, 1950, 1: 986.

Although brachial neuralgia is not as definitive a diagnosis as sciatica due to a herniated intervertebral disc, there are certain conditions which are quite comparable to the lumbar disc syndrome and

these are becoming more commonly recognized. Of a total of 66 patients, 42 showed evidence of having definite irritation of one or more cervical nerve roots. Twenty-four cases were discarded as belonging to a miscellaneous group which defied classification.

Important factors in the differential diagnosis are:

1. Osteoarthritis of the spine, which usually has a more insidious onset in elderly individuals, oftentimes with involvement of both upper extremities. Roentgenograms show the presence of osteophytes encroaching on the intervertebral foramen.

2. A prolapsed intervertebral disc may not show definite narrowing of the intervertebral space. However, the physical signs of single nerve root involvement with acute onset and aggravation of the pain by the neck compression test was more definite.

3. The "drooping shoulder girdle syndrome" which the author states "has had its province extended far beyond the bounds of reason."

Usually it is agreed that only the first thoracic and the eighth cervical nerve roots are involved in this syndrome due to compression by the anterior scalenus muscle. It is doubtful whether there is such a thing as primary spasm of the scalenus anticus muscle, but if so, it is more likely due to a lesion of the nerve root or roots, which causes the spasm. Nevertheless, in case of real doubt a scalenotomy may be worth a trial since it is a comparatively simple operation.

A most important point brought out by the author is that more frequently than has been previously supposed, an osteoarthritic spur of the neurocentral joint may encroach upon the intervertebral foramen and hence compress or irritate the individual cervical nerve of the cervical spine. In such cases, it is believed that rest is the most important factor in treatment. Physiotherapy and procaine injection into the tender muscular areas may give relief. In 2 patients a laminectomy was performed with considerable benefit, although the improvements were somewhat slow in one patient.

JACK I. WOOLF, M.D.

# SURGERY OF THE THORAX

## CHEST WALL AND BREAST

**Cuirass Cancer of the Breast Due to a Cryptococcus** (Cancer en coraza de la mama por un cryptococcus). FELIX F. GUNCHE, ANTONIO T. ALVAREZ, and ALBERTO BIGATTI. *Sem. méd.*, B. Air., 1950, 57: 763.

The authors state that their case of cuirass cancer allows important clinical, etiologic, and therapeutic deductions. Clinically, this cancer caused by a living germ must easily penetrate through the excretory tubes of the mammary gland, and the glandular secretion probably facilitates the development of the parasite. The cryptococcic nature of the germ gives rise to a special aspect of the skin which is covered by a large number of tiny red tumors of angiomatous appearance. This species of parasite is closely related to those parasites which produce the sarcomatosis of Kaposi and the disease of Schamberg; in fact, the tumoral process in this case suggested much more a sarcomatosis than a mammary epitheliomatosis. The vascular reaction observed clinically and confirmed histologically suggested that traumatism might have played a role because the sites where the first tumoral nodules appeared were those on which pressure was exerted by parts of the clothing. The diagnosis of sarcomatosis was eliminated by the study of biopsy specimens which confirmed the clinical suspicion of carcinoma "en cuirasse" of Velpeau.

Etiologically, the authors can affirm that the carcinoma of this patient was due to a fungus of the genus cryptococcus and that the microphotographs of smears of the tumoral tissue and of the blood showed very few differences from those of the cryptococcus haematicon studied in the sarcomatosis of Kaposi and the cryptococcus haematophylus of Schamberg's disease.

Therapeutically, it was sufficient to see the patient to realize that her extensive tumoral process would not respond to any local surgical or irradiation treatments. These were also excluded by examination of the blood which showed generalization of the parasite in the fluid portion and also in the red cells, thus indicating the use of general medications.

The general treatment consisted of ammoniacal copper sulfate 2 gm., caffein 1.50 gm., ammonium benzoate 2 gm., saccharose 5 gm., and boiled distilled water up to 100 c.c. This was divided in 50 ampules under aseptic conditions. The ampules were sterilized at 70°C. for from 20 to 30 minutes. The drug was injected intravenously while the patient was lying down. The dosage was increased gradually, beginning with 0.005 to 0.01 gm. and reaching 0.04 to 0.05 gm. daily for a total dose of from 0.50 to 0.60 gm. After a rest of 15 days the same treatment was repeated, the renal and hepatic functions being watched. According to the results, this treatment is continued or replaced with other medication. Locally, ammoniacal copper sulfate (1 per 1,000) in physiologic solution was applied in dressings which were covered by impermeable material and renewed when dry several times a day.

This treatment was well supported by the patient and decreased local pain; in addition, small tumors the size of a pinhead and of shot were resorbed in part, while the larger tumors decreased somewhat in size and lost some of their red color. However, the process was too far advanced to stop its complications and the patient died. RICHARD KEMEL, M.D.

## TRACHEA, LUNGS, AND PLEURA

**Bronchospirometry in the Lateral Decubitus Position.** EMIL ROTHSTEIN, FRANCIS B. LANDIS, and BENJAMIN G. NARODICK. *J. Thorac. Surg.*, 1950, 19: 821.

Bronchospirometry was performed in 11 patients in the supine and right lateral decubitus positions; 6 of these also had determinations while lying in the left lateral decubitus position.

Total oxygen consumption increased an average of 34 per cent while lying on the right side, and 9 per cent while lying on the left. This was due almost entirely to an increase in oxygen absorption by the under lung. In most instances a simultaneous decrease was noted in the oxygen consumption of the upper lung, although in a few of the determinations there was an increase in this factor.

A definite increase in the percentage of oxygen consumption was noted in every determination in the under lung. A slight increase in the total tidal air was noted in the lateral as compared with the supine position. A slight, but definite, increase in the percentage of tidal air was noted in the under lung in the lateral position.

The ventilation equivalent, obtained by dividing the total minute ventilation by the oxygen absorption, was decreased in the under lung, indicating increased efficiency.

The vital capacity values were inconstant.

A study of patients in whom oxygen consumption was measured in the lateral and supine positions with the Benedict-Roth apparatus showed an increased utilization of oxygen in the lateral, as compared with the decubitus position. No explanation for the increased oxygen consumption by the patient in a decubitus position is attempted at this time.

C. FREDERICK KITTLE, M.D.

**Electrophrenic Respiration. The Effectiveness of Contralateral Ventilation During Activity of One Phrenic Nerve.** STANLEY J. SARNOFF, EDWARD A. GAENSLER, and JAMES V. MALONEY, JR. *J. Thorac. Surg.*, 1950, 19: 929.

The authors state it has been demonstrated that cyclical electrophrenic respiration (one phrenic

nerve) produces effective artificial respiration, and also maintains within normal limits the arterial oxygen and carbon dioxide levels. During such respiration the motor respiration center is suppressed, apparently through the vagus nerve. Such facts could be explained by one of two mechanisms: either the blood vessels of the contralateral lung are intensely constricted so that all the pulmonary flow goes through the ipsilateral lung, or the contralateral lung is also aerated.

Using the Jacobeus technique of differential bronchospirometry and a Zavod catheter, they studied 4 tuberculous patients and 1 normal volunteer by stimulating the phrenic nerve electrically through the skin as it crosses the lateral ridge of the scalenus anticus muscle. The results from such stimulation were compared with those of spontaneous respiration. Serial chest films were taken in rapid succession on one of the authors during several full cycles of electrophrenic respiration to demonstrate the changes in the position of the right and left sides of the diaphragm and of the mediastinum.

The results demonstrated that during electrophrenic respiration of one nerve the contralateral lung was always adequately ventilated and the relative ventilation of both lungs was not significantly altered from that during spontaneous respiration.

The ventilation of the contralateral lung in the presence of no downward movement of the contralateral diaphragm is explained by mediastinal shift, which allows the expansion of the contralateral lung to the ipsilateral side. This can be demonstrated by fluoroscopy or by serial roentgenograms.

The authors discuss the correlation of their experimental results with the conception of phrenic paralysis in the rest of a tuberculous lung. They state: "In 9 cases studied by us and cited previously the relative ventilation changed only 3 per cent after operation. ... At respiratory volumes and rates approximating those of the resting state, the mediastinum has been shown to provide a normal relative ventilation and oxygen consumption for the lung in the absence not only of diaphragmatic action but also of intercostal activity ...." They suggest that any therapeutic benefit from phrenic nerve interruption results primarily from partial parenchymal collapse rather than from decreased ventilation (rest). BEATTY H. RAMSAY, M.D.

**Functional Bronchial Stenosis.** S. DI RIENZO. *Surgery*, 1950, 27: 853.

The importance of bronchial stenosis in the development of lung disease has been repeatedly emphasized. The causes of the condition have been classified as follows:

Extrabronchial causes are external compression, ganglions, aneurysms, hydatid cysts, and tumors.

Parietal causes are tumors (benign and malignant), bronchiolitis, retractile ulcers, and encysted foreign bodies.

Canalicular causes are loose or free foreign bodies, secretions, and mucous plug.

Endoscopy and bronchography show that there exists a normal physiologic cause for the stenosis which occurs during the moment of expiration. The diameter of the bronchus increases during inspiration and diminishes during expiration. In forced inspiration and expiration, this variation in the diameter of the main bronchi is several millimeters. The reduction of the bronchial caliber during expiration is accentuated at the origins of the main bronchi, and especially in the lobular trunks where an annular closing of the sphincter type may occur. These have been designated "radicular sphincters." It is during cough, however, that the maximum reduction of the bronchial caliber occurs, and a stenosis takes place which hinders the air from getting out, causing an accentuated retrograde hypertension. The bronchotracheal stenosis causes the air column to acquire extraordinary velocity. The act of coughing is, therefore, one of the most important factors causing functional bronchial stenosis. Owing to the great intensity of the force of the cough, retrograde hypertension is produced, which overcomes the resistance of the alveoli and causes them to rupture. Based on this dynamic conception of the cough, it is considered of prime importance in the genesis of either primary or secondary alveolar and bronchial ectasia. The fact that animals which are unable to cough do not suffer from bronchial ectasia is corroborative evidence of the primary importance of the cough in the pathogenesis of these processes.

An example of the dynamic bronchial stenosis is the crying of a child. This may cause progressive reduction in the caliber of the main bronchi, with a marked accentuation of stenosis in the radicular sphincteric system. Besides this dynamic stenosis of a physiologic character, which may be accentuated by pathologic factors, there are other types—static, permanent, or transitory—which are exclusively pathologic. The transitory static functional stenosis may be observed in an asthmatic crisis during attacks of bronchitis, and as a reflex phenomenon after abdominal operations. There are also permanent static functional stenoses, as observed in patients with bronchiectases, or in others after measles or whooping cough.

The classification of the causes of bronchial stenosis previously given should be completed by adding the following functional types:

Dynamic: expiration, crying, and coughing.

Static: transitory and permanent.

It would still be necessary to add those types of composite etiology, in which the organic factors are combined with the functional (as observed, for example, in cases with an intrabronchial foreign body) but which are more often present in most lesions which begin with an infection of the bronchial mucous membrane. SAMUEL KAHN, M.D.

**Pulmonary Hydatid Disease.** NORMAN WADDLE. *Austral. N. Zealand J. Surg.*, 1950, 19: 273.

As judged from the surgical publications of the last 2 years, there is considerable diversity of opinion

as to the correct management of pulmonary hydatid disease. The author reviews 478 cases extending over a period of 30 years, as recorded during that period in Australia and New Zealand. The purpose of the review is to evaluate the results of treatment.

Although the greatest incidence of the disease is in the 20 to 30 year age group, no particular inference can be derived from this finding because the hydatid cyst is known to grow very slowly over a period of years, and we have no means of calculating the age of a cyst from its size or appearance, nor does the onset of symptoms bear any clear relation to the date of infection.

Only 10 per cent of the series are recorded as having liver cysts present also. This infers that although pulmonary cysts are less common than those in the liver, nevertheless, when lung cysts are present the lung lesion is the only one present in the majority of cases. There is some evidence that the liver does not filter all the hydatids and that some may by-pass the liver via the lacteals and thoracic duct, and that mediastinal nodes may be the site of primary cysts.

The infestation-to-symptom latent period may be many years and discovery may first be by way of fortuitous x-ray examination. The cyst itself represents such a degree of biological adaptation of parasite to host that reactive symptoms are usually absent, and the presence of this disease is usually suspected only when a complication of the cyst, such as leakage, infection or frank rupture, occurs. Any pulmonary symptom may result and these usually persist or recur over a long period so that pulmonary tuberculosis is commonly suspected.

Clinical signs are usually those commonly associated with atelectatic lung or pleural effusion, and are nonspecific. Occasionally there is a local bulging of the chest wall which presents an unmistakable fluid thrill. Attempts to use an aspirating needle for diagnostic purposes constitute an error and may produce severe and even dangerous complications, not the least of which has been anaphylactic shock. It is emphasized that needle aspiration of a suspected hydatid cyst must never be done except in the course of an operation properly planned and with adequate safeguards against spilling.

Occasionally the symptoms may be catastrophically sudden and severe. Such symptoms usually occur in young, vigorous adults in whom a sudden physical effort or slight accident causes a rise in intrathoracic pressure with rupture of the cyst. This is followed by a copious hemoptysis, flooding of the bronchial tree with large quantities of hydatid fluid, and resultant asphyxia, or spontaneous hemopneumothorax. In this latter type of case an urticarial skin rash occurs as the result of massive absorption of a large amount of fluid (hydatid).

In all except the above mentioned type, in which hydatid elements may be found in the sputum, differential diagnosis depends upon (1) specific tests, including the presence of eosinophilia, and (2) interpretation of x-ray films, including bronchograms. The eosinophilia is completely valueless as a diagnostic aid, the Casoni test is positive in about 57 per cent of cases, the hydatid complement fixation test is positive in about 55 per cent, and either one or both of the latter two tests are positive in about 75 per cent of proved cases. It is apparent that a negative result does not exclude the diagnosis of hydatid disease. The variability of these tests is related to the presence or absence of leakage from the ectocyst. Without leakage the tests are negative. X-ray demonstration is invaluable for diagnosis and presurgical orientation. Frequently bizarre appearances are to be seen and have been described as "sign of the Camelot," "Cumbo's Sign," and so forth. Preliminary induction of pneumothorax for diagnosis may cause rupture of the cyst.

Because there is as yet no systemic treatment by which the parasite may be destroyed within its host, cure is achieved only by total elimination of the cyst and contents. Rarely, a patient may be cured by spontaneously coughing up a cyst. Surgical removal is not easy because the cyst is under tense pressure from within and the ectocyst is thin and friable. These make its intact removal impossible. Preliminary drainage procedures risk spilling of the contents, with inevitable seeding of scolices and multiple recurrences. The position of the cysts within the lung predisposes to bronchial fistula and to sepsis associated with ruptured cysts.

The author disagrees heartily with advocates of lobectomy. Such advice is given on the basis that cavities persist and bronchiectasis occurs so commonly that procedures less than lobectomy are unsatisfactory. Except where there is gross lung destruction or severe hemorrhage during removal of a hydatid cyst, lobectomy is unnecessary. Although bronchiectasis usually results in the majority of cases, this is asymptomatic as a rule, and only if symptoms develop should it be treated by surgical removal. The treatment recommended is removal of the cyst by one-stage operation, preferably before complications ensue. It is important to wall off the pleural cavity to prevent spillage, to reduce the tension of the hydatid cyst by aspirating it with a fine needle, preferably combined with a Fitzpatrick suction bell, then to remove the ectocyst, and finally to marsupialize and drain the pericystic cavity. Formalin is probably valueless.

The results are excellent, with most patients enjoying permanent cure. A few have recurrent or persistent disease. BEATTY H. RAMSAY, M.D.

**Spontaneous Hemopneumothorax and Its Indication for Thoracotomy** (Der spontane Haemopneumothorax und seine Indikation zur Thorakotomie). Franz Deucher. *Helvet. chir. acta*, 1950, 17: 170.

A survey of the literature covering the historical, etiological, and pathological features of spontaneous hemopneumothorax is given and 2 cases are presented.

Spontaneous hemopneumothorax occurs in connection with, and as a complication of, idiopathic

spontaneous pneumothorax. This is affirmed on the basis of case histories of recurrence, either on the same or on the opposite side, and on the finding of subpleural emphysematous bullae and pleural adhesions. There is no single cause for spontaneous pneumothorax, and its concept constitutes a purely clinical idea. The source of hemorrhage is most often from a torn pleural adhesion and more rarely from a ruptured emphysematous bulla.

Of the author's patients, 1 was treated conservatively by thoracentesis. In the other, thoracotomy with cauterization of the bulla and adhesion was necessary because of the threat to the patient's life. Operation was simple and successful.

In general, there are several methods of treatment for this affection, and the same rules apply as for traumatic hemopneumothorax. The methods are as follows:

1. Conservative, expectant treatment.
2. Thoracentesis and, when necessary, continuous suction drainage.
3. Thoracoscopic hemostasis.
4. Hemostasis by thoracotomy.
5. Early evacuation of the hematoma by operation.
6. Decortication for late complications and sequelae.

The indications for each method of treatment are discussed. JOHN L. LINDQUIST, M.D.

**Pulmonary Resections; Pneumonectomies and Lobectomies on the Left Side** (Les exérèses pulmonaires; pneumonectomies et lobectomies du côté gauche). A. MAURER, R. SAUVAGE, and M. MERLIER. *J. chir.*, Par., 1950, 66: 337.

In a previous article the authors discussed pneumonectomies and lobectomies as performed on the right side. Although the surgical conduct with regard to isolation, ligation, and suture of the arteries, veins, and bronchi is the same on both sides, the experience acquired in resections on the right side is of no use for those on the left. On the other hand, the latter are usually easier to perform and the cardiocirculatory complications are less frequent. The anatomic arrangement of the pedicles is relatively simpler on the left than on the right side.

The authors review the technique of total pneumonectomy on the left side by the anterior and the posterior approach, and of upper and lower lobectomy on the left side, and they stress the importance of pleuralization, revision, and hemostasis of the empty portion of the thorax, closure of the thoracic wall, drainage, and postoperative care, the latter requiring particular attention because of the fact that, while the cardiac equilibrium is better preserved than in operations on the right side, the function of the remaining lung seems to be threatened more often. They also insist on the necessity of a nearby transfusion center, of a large reserve of oxygen, and of the means of performing an efficacious bronchial aspiration at any moment. Success depends largely on many small but indispensable precautions, three of which deserve special mention: cardiac protection, safety of the ligatures, and bronchial impermeability.

Cardiac protection is insured by the intrapericardial injection of novocain which must be performed as soon as the pericardium is exposed; it is the best antidote against cardiac fatigue, which is often already quite marked after a difficult liberation. The injection may be repeated several times during the operation. The safety of the ligatures can be completely insured only by passing a suture on a fine needle through the vessel close to the proximal ligature. Bronchial impermeability depends on the quality of the suturing and of the suture material. The cutting of the bronchus must be tangential to the trachea or to the bronchial trunk, according to whether the bronchus is a principal or a lobar branch; however, this position will be advantageous only if a perfect suture in healthy tissue is performed and Sweet's technique is used. This requires the use of fine needles and fine, strong, noncapillary sutures: braided nylon and steel wire fulfil these conditions and should be used despite their inherent drawbacks and the difficulty of their manipulation. Each stitch must be passed perpendicularly, with its exit opposite to its entry, close but not too close to the free border; it is advantageous to double-stitch the angles. A point that cannot be overemphasized is the frequent friability of the posterior plane, the membrane of the bronchus, which may be torn easily by the traction of the knot when it extends too far. The pleuralization of the bronchial stump constitutes a rather safe protective measure against secondary fistula formation but not against a permeable closure; in fact, it would rather favor the spreading of air toward the mediastinum.

RICHARD KEMEL, M.D.

**Streptomycin Plus Alkalinization of the Pleural Cavity in the Treatment of Tuberculous Empyema.** ENRIQUE STAINES and CONSUELO CÁRDENAS. *J. Thorac. Surg.*, 1950, 19: 891.

The authors point out that nearly all reporters, including the American Trudeau Society Committee, conclude that streptomycin is of little or no value in the treatment of tuberculous empyema. Two other facts are mentioned: (1) that streptomycin activity is inhibited by an acid medium, and (2) tuberculous empyema has an acid reaction. Earlier investigators found that tuberculous empyema improves progressively as the *p*H becomes more alkaline. Based on these latter observations, they have treated tuberculous empyemas by pleural irrigation till all gross pus has been removed, the instillation of sodium citrate and streptomycin (penicillin also if the infection is mixed), and parenteral streptomycin for action on small bronchopleural fistulas or/and parenchymal foci. In each case the collapse therapy was maintained during treatment.

This therapeutic regimen was used on 35 patients, all adults afflicted with tuberculous empyema which developed during collapse therapy (intrapleural or

extrapleural pneumothorax). Koch bacilli were demonstrated in the empyema fluid in each instance. The authors report 23 complete cures, 10 patients markedly improved, and 2 unimproved.

The frequency of aspirations varied widely, depending principally upon the rate of reproduction of fluid; usually, aspirations were made at intervals of from 4 to 10 days. Such aspirations are performed in the second anterior interspace with a trocar that is long enough to reach to the posterior thoracic wall. It is believed that by thus avoiding a site bathed in dependent pus, the occurrence of fistulized needle tracts can be prevented.

BEATTY H. RAMSAY, M.D.

**Thoracoplasty and Streptomycin in the Treatment of Tuberculous Empyema.** MAURICE R. CONNOLLY and JAMES H. FORSEE. *J. Thorac. Surg.*, 1950, 19: 877.

The authors report 22 consecutive cases of tuberculous empyema. Treatment of these patients consisted of extrapleural thoracoplasty and streptomycin therapy. Fourteen patients developed the empyema as a direct result of their disease and unrelated to any therapeutic effort; in 7 patients, empyema occurred after artificial pneumothorax, and in 1 patient after extrapleural thoracoplasty, before the advent of streptomycin. Fifteen of the patients had mixed infections associated with parenchymal disease; 4 of these died. Seven patients had pure empyemas (tuberculous) with parenchymal disease.

In 7 cases in which the empyema developed suddenly and with extreme sepsis, open or closed drainage was necessary as a life-saving measure. Patients in whom the onset was gradual did not receive surgical drainage, but in such cases frequent aspirations were used during thoracoplasty.

The results obtained are given as follows: 17 patients are alive with arrested disease, 1 is alive with active parenchymal disease, and 4 are dead.

BEATTY H. RAMSAY, M.D.

**Resection of an Intrathoracic "Hibernoma."** C. FREDERICK KITTLE, JAMES O. BOLEY, and PAUL W. SCHAFER. *J. Thorac. Surg.*, 1950, 19: 830.

The case history of a 42 year old housewife with a large mass in the left side of her chest, discovered on routine roentgenography, is presented. This mass had produced mild symptoms of respiratory difficulty which had been attributed to asthma. Thoracotomy was performed for therapeutic and diagnostic measures. The tumor originated from the intercostal structures or the parietal pleura of the lateral chest wall and measured 14 by 12 by 8 cm. It weighed 1,000 gm. Microsopically, it was a particular type of lipoid material known as hibernating fat. Tumors of this structure are believed to constitute a definite oncologic entity, hibernoma. Chemical analysis of the hibernoma showed it to have a lower melting point and a higher amount of polyunsaturated fatty acids than the usual lipoma. The patient recovered uneventfully.

Hibernoma was first described by Merkel in 1905, and since that time approximately 9 cases have been reported in the medical literature; most of these tumors were located subcutaneously. A homologue of the hibernating gland is present in man, occupying a position between the scapula and the clavicle on the sides of the neck. The physical aspects of this type of tissue has been controversial for many years, some of the suggested functions being hemopoiesis, hemocatheresis, fat storage; it has also been considered part of the thymus, as originating in the autonomic nervous system, and as an endocrine gland.

It is believed that this is the first reported instance of an intrathoracic hibernoma. The importance of exploratory thoracotomy for a definitive diagnosis is stressed.

C. FREDERICK KITTLE, M.D.

## HEART AND PERICARDIUM

**Foreign Bodies in the Cardiovascular System.** N. R. BARRETT. *Brit. J. Surg.*, 1950, 37: 416.

In a careful review of available records, the author derives a number of conclusions regarding intravascular foreign bodies. Numerous representative cases are outlined and 6 personal cases are recorded.

Nine ways of foreign body entry into the venous system are described. If it is lodged in a peripheral vein, it should be removed. The difficulty in making the diagnosis of intravascular foreign body prior to migration is stressed. Migration is frequently into the heart.

Foreign bodies in arteries usually have entered the arterial system through the left ventricle or aorta. Consequently, treatment of cardiovascular foreign bodies is concerned mainly with management in and about the heart.

Conclusions regarding operative intervention are based on the location, size, shape, weight, and degree of infectiousness of the foreign body. The longer it has been in the cardiovascular system the less reason there is for operative removal because of technical difficulties and decreasing risk of complications. Aside from hemorrhage and tamponade, there is no immediate indication for operative removal of intracardiac foreign bodies. Careful planning and localization give better results if the patient is carried through the immediate danger period. Future removal can then be based on the degree of pain, cardiac irregularities, or an estimate of future complications. Because of rapid healing (if the area is uncontaminated), the site of entry into the cardiovascular system by a foreign body cannot be found after several days. This is true of the heart as well as the vessels. Migration of an intravascular foreign body may be progressive or retrograde, depending on speed of blood flow, weight of object, and changes in position. Intracardiac migration may be along direct routes, the object may remain free for as long as 8 weeks in heart chambers, it may become encysted against the heart wall, or even migrate paradoxically when a patent foramen ovale or ventricular

septal defect is present. For these reasons it is impossible to predict an eventual site of rest. In addition, clots may form on the foreign body and cause embolic phenomena, and infection is always potential.

An analysis of recent surgery on the heart indicates a high degree of operative safety. For this reason, and because of the immediate and long term potential dangers of intravascular and intramural foreign bodies, there is no need to justify surgical removal. In fact, justification should be greatest for not performing surgery before an object is allowed to remain in the vascular system. ROBERT L. CRAIG, M.D.

**An Experimental Study of the Anastomosis of Arteries to the Coronary Sinus of the Heart of the Dog.** THOMAS N. P. JOHNS, MARSHALL C. SANFORD, and ALFRED BLALOCK. *Bull. Johns Hopkins Hosp.*, 1950, 87: 1.

The authors outline the various methods used to overcome or ameliorate impaired coronary circulation. They believe that efforts to anastomose arteries to the venous system of the heart, with the hope that backward flow of blood through the veins and capillaries of the myocardium will occur, appear to be the soundest approach to the problem. They point out that the hypothesis that tissues may be nourished effectively by the backward flow of blood through the capillary bed remains unproved.

Experiments have been carried out in which an artery was anastomosed to the coronary sinus of the dog heart. The methods used were similar to those employed by Beck, Stenstrom, and others, and therefore are not described. Only experiments wherein a carotid artery or a pulmonary artery was anastomosed to the coronary sinus are described—use of other arteries usually resulting in thrombosis.

Arteriovenous anastomosis of carotid artery to coronary sinus was done in 4 groups of animals, a different procedure being used for each group. Group 1, sinus not occluded; Group 2, sinus occluded partially; Group 3, sinus occluded simultaneously; Group 4, sinus occluded as a preliminary measure for 10 to 14 days. In a fifth group of animals, arteriovenous anastomosis of pulmonary artery to coronary sinus was done after preliminary ligation of the coronary sinus. Each ligation of the coronary sinus was done at its terminal end. Several animals in each group were subjected to ligation of the coronary artery as a test of the efficacy of the procedure.

The results are given in detail. They indicate, as does the work of Stenstrom (and of others), that such anastomoses may, for a short time, produce a retrograde flow in the coronary sinus with engorgement of the superficial one-third of the left ventricular wall. Later this tissue shows varying degrees of fibrosis. When the pulmonary artery is used, a backward flow of blood in the pulmonary artery may occur.

Many of the dogs die immediately following the procedure (not as many following the procedure in which the coronary sinus is not ligated). In the dogs that survive, many of the anastomoses become occluded by thrombosis—less in those in which the coronary sinus is not ligated. When the sinus is not obstructed terminally there is little backflow along the sinus. In those cases in which arterialization of the coronary sinus is successfully accomplished, as far as temporary patency of the anastomosis is concerned, long-term results are not satisfactory. Among 9 such animals in which ligation of the anterior descending coronary artery was performed, 3 died, infarction developed in 3, and 3 survived without infarction.

"While animals with persistently functioning anastomoses may gain a measure of protection against coronary artery occlusion, these experiments indicate that this benefit is not sufficiently adequate or dependable to warrant clinical application at the present time." BEATTY H. RAMSAY, M.D.

**Studies of the Pulmonary and Systemic Arterial Pressure in Cases of Patent Ductus Arteriosus with Special Reference to Effects of Surgical Closure.** BOWEN E. TAYLOR, ALBERT A. POLLACK, HOWARD B. BURCHELL, O. THERON CLAGETT, and EARL H. WOOD. *J. Clin. Invest.*, 1950, 29: 745.

A patent ductus arteriosus has been found to shunt 4 to 19 liters of oxygenated blood from the aorta to the pulmonary artery each minute, representing 45 to 75 per cent of the output of the left ventricle; however, even with pulmonary blood flow of from two to four times the systemic flow, the pulmonary arterial pressure has been within normal limits in most cases in which measurements have been made. These results are in agreement with data obtained by Cournand which indicated that in normal man the flexibility of the pulmonary vessels is such that the flow through them can be increased two to three times without an appreciable increase in pulmonary arterial pressure.

It might be expected that closing a patent ductus arteriosus with a flow of such magnitude would cause a dramatic cardiovascular response. The lack of knowledge of the immediate changes in the circulodynamics during closure of a patent ductus arteriosus, and especially of the changes occurring in the pulmonary arterial pressure led to study of these physiologic variables before, during, and after surgical correction of this condition.

Preoperative cardiac catheterization was performed in 6 of the patients. Pressures were recorded in the pulmonary artery, right ventricle, and right atrium by means of a strain gauge manometer.

Before and after the operation for closure of the patent ductus arteriosus, direct arterial pressures, electrocardiogram and heart rate were recorded in some of the patients during rest in the supine position, standing at rest, walking 1.7 miles per hour for one minute, and also during another one-minute period of walking 3 miles per hour. The pressures were recorded by an intraradial arterial needle con-

nected by 30 cm. of polythene tubing to a strain gauge manometer.

Photographic records of the radial arterial pressure, the pulmonary arterial pressure, electrocardiogram, instantaneous heart rate, and respiration were made by means of a mobile oscillograph during the operation for closing of the ductus arteriosus. Both arterial pressures were recorded by means of strain gauge manometers.

During operation, after the patent ductus arteriosus had been isolated and ligatures had been placed loosely around it but not tied, the diameter and length of the ductus were measured by means of small calipers. The needle attached to the sterile strain gauge manometer used to measure the pulmonary pressures was then inserted into the left pulmonary artery slightly distal to the ductus arteriosus. Simultaneous records of the radial and pulmonary arterial pressures were made while the ductus arteriosus was closed and opened by means of rubber covered surgical forceps.

Mean pressures were determined from the recorded pulse contours by planimetric measurement of at least a 10 second period of the continuous recording of the pressure. Values for systolic and diastolic pressure were obtained by averaging the values obtained for each pressure pulse during this same period.

In 6 patients in whom preoperative cardiac catheterization studies were performed, the average flow through the patent ductus arteriosus was calculated to be 7.4 (1.6 to 17.7) liters per minute.

Calculations based on the oxygen saturation of systemic arterial, pulmonary arterial, and mixed venous blood samples obtained in 12 patients indicated that the average flow through the patent ductus arteriosus was 44 (23 to 80) per cent of the left ventricular output. The outside diameter of the ductus arteriosus in 9 of these cases averaged 9.9 (7.6 to 13) mm.

Continuous, direct, radial arterial pressures in 7 patients with a patent ductus arteriosus and in 7 normal subjects, recorded during standing at rest and walking 1.7 and 3 miles per hour, showed on the average that the patients had a higher pulse pressure than the normal subjects, a moderately increased systolic pressure and a slightly decreased diastolic pressure. The changes in blood pressure produced by exercise were similar in patients before and after ligation of the ductus arteriosus and for practical purposes not different from those obtained in normal subjects. Exercise did not produce a decrease in diastolic pressure in these cases.

The average pulmonary arterial pressures measured in 16 of the patients with patent ductus arteriosus were slightly elevated above the values reported for normal subjects.

Closure of a patent ductus arteriosus in 15 patients produced an immediate increase in the systemic systolic and diastolic arterial pressure in every instance. There was also a significant, immediate decrease in the pulmonary arterial pressure.

**Primary Angiosarcoma of the Heart.** HALL S. TACKET, RUSSELL S. JONES, and J. WARREN KYLE. *Am. Heart J.*, 1950, 39:912.

The authors present the case history of a negro woman, age 45, who had right heart failure, bloody pericardial effusion, and an irregularity of the right cardiac border on the roentgen film. Autopsy revealed that the right heart failure was due to mechanical obstruction of the blood flow by a polypoid, globular angiosarcoma of the right atrium, extending into and filling the tricuspid orifice, and partially obstructing the orifices of the vena cavae and the coronary vein. The tumor was in direct contact with the intracardiac blood which could presumably have been the source of metastases to the right ventricle, although the Thesbian venous network is a plausible route of malignant spread since venous tumor emboli were found in the heart. Such an explanation has been offered by Yater for the predominance of metastases to the right side of the heart while the left ventricle and atrium are spared. Approximately 60 per cent of the venous blood of the heart musculature empties through the Thesbian veins into the right atrium and ventricle; only 20 per cent empties through the Thesbian system into the left atrium and ventricle; the remainder empties through the coronary veins.

Primary malignant tumors of the heart are rare; about 100 have been recorded in the world's literature. Most primary cardiac malignancies appear to arise in the right heart and especially in the right atrium. It is probable that all arise from primitive or embryonal mesenchyme. Angiomas or varices of the endocardium are most common in the region of the foramen ovale.

The variety of the clinical manifestations of tumors of the heart prevents the delineation of a specific syndrome. Certain symptoms and signs are suggestive. These include: heart block without apparent cause; symptoms referable to the location of the tumor, such as unusual distribution of edema, attacks of intense dyspnea or cyanosis, with change of position, or signs of tricuspid and pulmonic stenosis; symptoms of cardiac dysfunction without apparent cause in a patient with a known malignant process; accumulations of hemorrhagic pericardial fluid; and certain suggestive roentgenologic observations. Although cardiac embarrassment by tumor may be minimal despite massive involvement of the heart, intractable heart failure without obvious cause should suggest the possibility of a neoplasm of the heart. ORVILLE F. GRIMES, M.D.

**Rhabdomyosarcoma of the Heart.** M. D. HARGROVE, W. M. HALL, and F. T. DIENST, JR. *Am. Heart J.*, 1950, 39: 918.

Among the primary malignant tumors of the heart, the rhabdomyosarcoma is perhaps the rarest. To date, only 5 other case reports have appeared in the literature. The authors present the case history of a patient having such a tumor whose diagnosis was suspected ante mortem.

The patient, a 43 year old negro male, presented four clinical findings suggestive of primary tumor of the heart: intractable myocardial insufficiency in the last few months of life, otherwise not explained, depression of the sino-auricular node with nodal rhythm, roentgenologic evidence of enlargement of the heart of an unusual pattern, and recurrent hemorrhagic pleural effusion.

The site of origin of the lesion was thought to be in the right auricle with extension to the tricuspid valve and right ventricle and metastases to the pleura, lungs, and pericardium.

ORVILLE F. GRIMES, M.D.

**Ligation of Left Auricular Appendage for Recurrent Embolization.** IVAN D. BARONOFSKY and ABBOTT SKINNER. *Surgery*, 1950, 27: 848.

In rheumatic valvular disease, the location of intracardiac thrombi is predominantly within the auricles. The right as well as the left auricle may be involved. There appears to be an even higher incidence of auricular appendage thrombosis in cases of right auricle involvement than in those in which the left auricle is affected.

Three cases in which left auricular appendage ligation has been performed are presented. These are instances of recurrent embolization, as a complication of rheumatic mitral stenosis. In each case, the course of the patient during the surgical procedure and the immediate postoperative convalescent period was uneventful.

It is suggested that ligature of the auricular appendage be used as an additional surgical approach to the problem of recurrent embolization in rheumatic mitral disease, because of its simplicity as compared to resection of the auricular appendage. In cases in which symptoms of pulmonary infarction are associated with rheumatic heart disease, it may be advisable to ligate the right auricular appendage.

SAMUEL KAHN, M.D.

**The Fate of an Artery Implanted in the Myocardium.** FRANK GLENN and JOHN M. BEAL. *Surgery*, 1950, 27: 841.

Attempts at increasing the vascularity of the heart have centered, in general, about three types of procedures: (1) interruption of the nerve supply of the heart; (2) reversal of the flow of the coronary sinus, with or without an arterial shunt; (3) formation of adhesions with other structures.

The authors studied the results of implanting the internal mammary artery into the myocardium of the left ventricle of dogs. Six such experiments were done.

Three interesting findings were observed:

1. There is a lack of reaction in the myocardium to the implanted artery. The animals tolerated the operative procedure well; microscopic sections show that the myocardium reacts little to the systemic artery buried within its substance.

2. The lumen of the implanted artery remains patent, despite a rather marked intimal proliferation. Since this has persisted for as long as 6 weeks after operation, and since small vessels have been found in the region of the junction of the artery and myocardium, it may be assumed that blood is circulating through the vessel.

3. The changes at the end of the implanted artery are those of organization and channeling. It was feared that placing the open end of a systemic artery in the myocardium might result in hematoma formation and fibrosis, but this has not been found.

SAMUEL KAHN, M.D.

**Anesthetic Problems in Children Undergoing Operations on the Heart and the Great Vessels.** FRANCIS M. GREM. *Arch. Surg.*, 1950, 61: 259.

Preoperative management of congenital cardiovascular anomalies requires that the patient be brought to operation in the best condition possible. In hypoxic children with tetralogy of Fallot, morphine is used to decrease oxygen demand, lessen the amount of anesthetic agent used, and facilitate controlled respiration. Large doses of atropine are given to inhibit secretions and suppress vagal activity.

The favored anesthetic agent is cyclopropane administered through an endotracheal tube. By this method the following benefits are obtained: rapid induction with high oxygen tension, quick return to consciousness, a patent controlled airway, a quiet operative field, and easy removal of secretions.

In the operative management, hypoxia and abnormal reflex mechanisms must be handled. Harmful reflexes are initiated by forceful spreading of ribs, manipulations in the hilar lung area, and traction on the base of the heart or the great vessels. As a consequence, hypotension, slowing of the heart, or cardiac arrest or fibrillation may ensue. Such abnormal reflexes may be avoided or reduced by posterior blocking of intercostal nerves and the application of 5 per cent cocaine to the pericardium and hilus of the lung. Cerebral accidents are prone to occur in cases of tricuspid atresia and tetralogy because of polycythemia and increased viscosity of the blood. The intravenous administration of atropine is especially indicated to increase the cardiac rate and force of the circulation.

There should be no hesitancy in canceling an operation if the anesthesia is not well tolerated. Reinflation of the lung should always be done before the vascular anastomosis is begun or the pulmonary artery is clamped. This will provide a maximum of oxygen reserve. In cases of cardiac arrest, 100 per cent oxygen is administered, 5 per cent cocaine is applied to the heart, and rhythmic massage carried out. Icebags are applied should the patient's temperature rise. On completion of the operation the lungs are re-expanded, the tracheobronchial tree is cleared of secretions, and the chest cavity drained. Should the patient fail to waken promptly, hypoxic brain changes should be expected.

Postoperatively, blood pressure and pulse are carefully watched. Bradycardia and hypotension

are vigorously and promptly treated to prevent cerebral thrombosis. Fluids and vasopressors are given as required. Oxygen by tent or catheter is administered as long as necessary.

BENJAMIN G. P. SHAFIROFF, M.D.

**Surgical Treatment of Tuberculous Pericarditis.** EMILE HOLMAN. *Arch. Surg.*, 1950, 61: 266.

Early cardiac decompression by radical pericardiectomy is recommended for patients with tuberculous pericarditis. Patients critically ill during the stage of pericardial effusion may be operated upon by a two-stage procedure. In the first operation, the left sixth costal cartilage is removed, the pericardial sac opened, and the pus evacuated. The pericardium is drained. After 10 to 20 days, through a median sternotomy, radical pericardiectomy is performed.

Based on the present experience, it is suggested that operation be performed in an early phase of the disease, during the period of effusion or in the stage of pericardial contraction. With this method, severe myocardial damage may be avoided. This rationale of therapy is in direct contradiction to older medical methods dependent on prolonged bed rest and expectant waiting for resorption of the pericardial fluid.

Radical pericardiectomy was performed in 4 proved cases of tuberculous pericarditis. Cure was obtained in 3 cases and marked progressive improvement was noted in 1 case. Early radical pericardiectomy is dependent on the full usage of antibiotics. BENJAMIN G. P. SHAFIROFF, M.D.

## ESOPHAGUS AND MEDIASTINUM

**The Extent to Which One May Interfere with the Blood Supply of the Esophagus and Obtain Healing of Anastomosis.** JOSEPH E. MACMANUS, JOSEPH T. DAMERON, and JOHN R. PAINE. *Surgery*, 1950, 28: 11.

Fifteen per cent of esophageal carcinomas occur at or near the superior thoracic aperture. Although the literature contains several case reports describing the excision of such lesions with esophagogastric anastomoses in the neck, there is no generally established technique of management of this type of lesion. Harper suggested to one of the authors that if it were possible to preserve a portion of the lower esophagus attached to the stomach, this could be passed readily through the cervical aperture of the thorax and would simplify the anastomosis in the neck. Accordingly, various operations were performed on 46 dogs to determine, first, to what extent the blood supply of the esophagus could be interfered with without producing necrosis, and second, whether or not a significant portion of the distal esophagus could be left attached to the stomach and survive when the stomach was freed from its attachments (by cutting the left gastroepiploic, left gastric, and short gastric vessels) and pulled up into the chest.

The collateral blood pathways in the wall of the esophagus are sufficient to maintain viability of tissue and to insure healing of an anastomosis when the entire thoracic blood supply to this organ has been severed. When the cervical esophagus is devascularized in addition to the thoracic esophagus, necrosis frequently occurs. In each instance reported, such necrosis occurred at approximately the same level, namely, that of the second thoracic vertebra, and this is consistent with anatomic knowledge that the transition zone between the cervical and thoracic esophagus has the poorest blood supply of any part of the organ. When devascularization of the stomach, except for the right gastric and right gastroepiploic arteries, is added to devascularization of the entire esophagus, necrosis occurs in nearly all cases. Such necrosis occurs above the level of the azygos vein. Collateral blood flow to the esophagus from the partially devascularized stomach is sufficient to protect the lower two-thirds of the thoracic esophagus from necrosis. In dogs, at least, portions of the upper thoracic esophagus may be excised, leaving a sizeable portion of the distal esophagus attached to the stomach and this may be passed into the neck for re-establishment of the esophageal continuity. It is possible that a similar procedure is feasible in human patients.

The authors will not recommend such a procedure in humans until the function of the denervated, devascularized esophagus has been more fully studied. They are impressed by the rather consistent dilatation of the esophagus which followed their experiments outlined here. They are pursuing their studies in this regard.

This is a valuable study and report, and those interested in esophageal surgery are advised to read the entire article. BEATTY H. RAMSAY, M.D.

**Cysts of the Esophagus. Case Report and Review of Literature.** ALBERT CORNELL, MARVIN L. BLUMBERG, and IRVING A. SAROT. *Gastroenterology*, 1950, 15: 260.

Reduplication cysts of the gastrointestinal tract are uncommon. The authors collected 20 cases from the literature of the last 25 years, to which they add another report of successful removal of an intramural esophageal reduplication cyst from a 19 months old male, following which the patient obtained relief from a brassy cough caused by tracheal compression and displacement. Microscopic examination of the cyst demonstrated ciliated epithelium, smooth muscle and mucous glands with a histologic structure somewhat similar to a bronchus.

Cysts of the esophagus are classified as reduplication cysts of the alimentary tract, ciliated epithelial cysts, cysts arising from islands of gastric mucosa, cystic or follicular esophagitis, and retention cysts of ducts and mucous glands. Symptoms of reduplication cysts usually arise as the result of obstructive pressure on external viscera, pain from cystic distention, or hemorrhage caused by compression of vital blood vessels. Surgical excision is the only satisfactory method of treatment of reduplication cysts.

THOMAS LANE STOKES, M.D.

**Two Primary Pedunculate Sarcomas of the Esophagus** (Deux sarcomes primitifs de l'oesophage pédicules). J. L. LORTAT-JACOB and BADARO. *Sem. hôp. Paris*, 1950, 26: 1743.

Only 32 authentic observations of primary sarcoma of the esophagus are reported in the literature, but the authors describe 2 cases discovered by histologic examination among 90 specimens of malignant tumor of the esophagus operated upon in 2 years. The first patient died 3 days after operation from an intense posttransfusional icterus with nearly complete anuria. The second patient was discharged with normal deglutition and digestion, but died 6 months later from cachexia without presenting macroscopic local extension.

The large volume, the polypoid aspect, and the narrow implantation pedicle (2–3 cm.) of this sarcomatous tumor are striking. Developing at the expense of any layer of the esophageal wall, but most often, as in the present 2 cases, at the expense of the submucosa, the tumor protrudes into the esophageal lumen and remains covered by the intact or secondarily ulcerated mucosa, or it penetrates through the wall by dissociating the longitudinal muscular fibers and by its volume deforms the vertical axis of the esophagus. A thin capsule circumscribes the tumor and allows it to be shelled out from the healthy esophageal wall and the neighboring organs.

There is no clinical characteristic which can serve to distinguish sarcoma from the other tumors of the esophagus; the pain, dysphagia, alteration of the general condition, and even the evolution of the disease have no absolute value. Pain may be discrete or even absent. Dysphagia depends on the site of the tumor and not on its nature, and the same applies to paralysis of the recurrent nerve which sometimes accompanies these tumors. Fetidity of the breath is inconstant and encountered only in the ulcerating endoesophageal sarcomas, as in the present 2 cases. The alteration of the general condition may be very marked while the dysphagia is still slight. The duration of the disease is supposed to be 5 or 6 months; in the second case it was a year. All in all and despite satisfactory intervention, the evolution seems to be inexorable and the malignancy very great.

The roentgen aspect of the tumor has no pathognomic value. In the extraesophageal forms the image is similar to that of tumor of the posterior mediastinum; in the endoesophageal forms it resembles that of benign tumor.

Esophagoscopy may also fail, since reports show that one case was mistaken for an esophageal abscess and another for diphtheria because of a necrotic layer that covered the tumor. Biopsy alone allows making the diagnosis of sarcoma during life.

Treatment can be only surgical. After careful preparation of the patient, the esophagus must be resected far from the lesion despite the integrity of the juxtatumoral wall, and then the gastroesophageal anastomosis is performed. The infiltration of the wall by the tumor is always very limited, contrary to what occurs in epithelioma; however, this sign has pathognomonic value. The external aspect of the esophagus may not be changed at all and there are no adhesions or adenopathies; except for the volume, the esophagus looks healthy. In the present 2 cases, palpation revealed the site of the tumor.

RICHARD KEMEL, M.D.

# SURGERY OF THE ABDOMEN

## ABDOMINAL WALL AND PERITONEUM

**Repair of Obturator Hernia with a Tantalum Gauze Implant.** TOM DERCUM THROCKMORTON. *Surgery*, 1950, 27: 888.

Tantalum gauze has proved an effective means of closing hernial defects when tissue deficiency or the type of defect has made a satisfactory autoplastic closure impossible.

A case of obturator hernia is reported, in which the use of a tantalum gauze implant has simply and effectively barricaded the rigid internal obturator opening for 4 years. There is every reason to assume that this satisfactory result will be permanent.

SAMUEL KAHN, M.D.

## GASTROINTESTINAL TRACT

**Massive Hemorrhage in the Upper Part of the Gastrointestinal Tract. Emphasis on the Atypical Type.** RALPH H. LOE. *Arch. Surg.*, 1950, 61: 183.

The records of 94 private patients with massive hemorrhage in the upper part of the gastrointestinal tract, who were treated at the Swedish Hospital, Seattle, Washington, between 1943 and 1949, serve as the basis of this study. Seventy-three per cent of these patients had various types of peptic ulcers. Seventy-one per cent were over 50 years of age. In the medically treated patients, the mortality rate was 1.9 per cent. Seventeen patients with ulcer were subjected to operation without a death.

Twenty-five patients, or 27 per cent of the series, were in the atypical group of massive upper gastrointestinal hemorrhage. Most of these were over 50 years of age. Eighteen per cent of the 16 patients treated medically expired. Forty-four per cent of the 9 patients treated surgically expired. The cause of hemorrhage in this group was gastric and esophageal varices, carcinoma, gastritis, thrombopenic purpura, leiomyoma of the jejunum, hemophilia, and carcinoma of the pancreas complicated by gastric ulcer. In several of the surgically treated cases, the operator failed to find the bleeding point. It is emphasized that this is a strong argument for nonmanipulative x-ray examination prior to emergency operation if the definite diagnosis of ulcer cannot be established.

It is pointed out that the strikingly low mortality in both the operative and nonoperative groups with ulcer implies that a part may be played by socionomic forces, since all these cases were private patients. However, if such a beneficial economic factor was of importance in accounting for the low death rate with ulcer, it was certainly nullifying in the cases of atypical hemorrhage, in which the mortality was 28 per cent.

As adjunctive therapy in upper gastrointestinal hemorrhage, frequent feedings to maintain nutrition and absorb gastric juices and continuous neutralization by antacids were used. No ill effects from gastric intubation were seen. Blood was used freely whenever the blood pressure fell below 100 mm. of mercury systolic. Enough blood was given to return the pressure to that level. Major replacement of lost blood in the aged is of utmost importance, and if blood volume is well maintained, surgical intervention can be deferred until the failure of medical means is manifest. The atypical cases of hemorrhage emphasize the pitfalls of emergency surgical procedures in contrast to the advantages of accurate diagnosis and elective treatment. Surgical management of bleeding ulcer consisted in most cases of partial gastrectomy. At operation, direct inspection of the stomach, duodenum, and esophagus by means of a sigmoidoscope passed through an opening in the anterior portion of the pylorus, is advised in those cases in which the source of hemorrhage cannot be found. The use of pneumatic tamponade is advised for the control of bleeding from esophageal varices.

CURTIS ARTZ, M.D.

**Gelfoam and Thrombin in Gastroduodenal Bleeding. An Experimental Study.** MEYER O. CANTOR and ROLAND P. REYNOLDS. *J. Laborat. Clin. M.*, 1950, 35: 890.

The authors, stimulated by the reports of Daly, and of Daly, Johnston, and Penberthy on the use of bufferred thrombin as a hemostatic agent in upper gastrointestinal bleeding, have carried out experimental procedures on dogs to investigate the added value that might accrue from the use of gelfoam powder and thrombin. They review the principles of the use of both of these substances. Through a gastrotomy incision they excised a standard section of the stomach wall, varying the depth of the section to induce venous and arterial bleeding, and studied the effects of these agents separately and together upon the wounds; the hemostatic agents were applied both topically and through tubes passed orally, and the results were observed through a sigmoidoscope introduced through the gastrotomy wound.

The combined thrombin and gelfoam powder was found to be markedly superior to either of these agents used separately, both in the speed in which clotting was induced in all types of wounds and in the character of the clot formed; the clot formed by gelfoam powder and thrombin together is described as being flat, tough, and firm, and as being dislodged with difficulty. It would appear from the report that a concentration of 250 Iowa units of thrombin with 2 tablespoonfuls of gelfoam powder were used in the various solutions and suspensions with which the authors experimented; gelfoam powder tended to separate out of water, but mineral oil, milk, and cream were excellent vehicles.

The authors learned that it is necessary for the solution to come in contact directly with the bleeding area, and they found it necessary to position the experimental animals so that pooling of the injected solution did not occur in a region away from the lesion; such a positioning of the patient might prove to be necessary in any clinical application of this method. The authors comment on the extreme rapidity of clotting in the dog as compared with man and point out the differences between these experimental wounds of the gastric mucosa and submucosa in dogs and ulcerating lesions of the stomach in humans. They believe, however, in view of the observed superiority of gelfoam powder and thrombin in combination over thrombin alone as a hemostatic agent, under the experimental conditions set forth, that the plan merits clinical application to bleeding gastroduodenal lesions and further study of the effects. WILLARD BARTLETT, JR., M.D.

**Vagotonic Pseudoulcerous Antropylorobulbitis; Treatment of Rebellious Forms by Bilateral Subdiaphragmatic Vagotomy** (Die vagotonische pseudo-ulzeroese Antro-pyloro-bulbitis; die Behandlung der hartnaeckigen Formen durch die doppelseitige subdiaphragmatische Vagotomie). J. JACQUES DUBARRY and GEORGES DUBOURG. *Wien. med. Wschr.*, 1950, 100: 296.

Severe, primary cases of gastroduodenitis with lesions on both sides of the pylorus have long been known under various names, such as pyloritis, gastropyloroduodenitis, duodenitis, gastropyloritis, and red stomach, but the authors prefer the term of antropylorobulbitis which corresponds to the usual topography of the lesions. Believing that the misleading roentgenologic and clinical syndrome of ulcer often develops on a vagotonic basis, the authors have used bilateral subdiaphragmatic vagotomy in the forms which did not respond to medical treatment. The remarkable results which they obtained in the course of 4 years during which they treated 43 personal cases seem to confirm the independence of these disease pictures.

In these patients it is important to search for signs of vagotonia: clinically, increase of the oculocardiac reflex (the slowing should exceed 8 pulsations per minute), disappearance of the retching reflex, relative hypotony; roentgenologically, hypertonic stomach (which may become hypotonic when there is an impediment to emptying at the pylorus); biologically, hyperchlorhydria of the gastric juice in the fasting state and after the histamine test.

In these cases of antropylorobulbitis, the gastritis must be treated medically. However, there are rebellious forms which are so painful that the patient, because of the failure of medical treatment, requests the intervention which the physician hesitated to propose in view of the uncertainty of the diagnosis.

In the authors' series the first 15 patients were carefully selected and 14 were cured and have remained cured; the patient in whom the operation failed was later found to have an extensive tuberculous perigastritis and had to be subjected to gastrectomy with duodenojejunostomy. Encouraged by these results, the authors relaxed their strict indications for vagotomy in the next 21 patients and obtained for vagotomy alone 9 good results, 1 fair result, and 1 death; for vagotomy plus gastrectomy, 2 good and 2 fair results; for vagotomy plus extramucosal pylorotomy (in hypertrophic pyloric stenosis), 2 good results and 1 death; for vagotomy in patients who had undergone several gastric operations, 1 fair result and 2 bad results. The 2 deaths occurred on the third postoperative day, one due to massive embolism and the other to collapse. Although these deaths could not be attributed to any technical error, they contributed to the impression that it was advisable to return to the strict indications for the operation. As a consequence of this decision, excellent results were again obtained in the next 7 cases.

No patients were subjected to special care, such as continuous aspiration of the gastric juice. Some had rather marked distention of the abdomen and even profuse diarrhea, and most of them had for several months a decided feeling of discomfort due to delayed digestion and slight aerophagia. Pilocarpine was given by mouth to the last patients and seems to have had a remarkably good effect on the discomfort.

RICHARD KEMEL, M.D.

**The Surgical Treatment of Peptic Ulcer.** A. G. R. LOWDON. *Edinburgh M. J.*, 1950, 57: 1.

The indications for surgical treatment of peptic ulcer and the choice of operation are presented along with certain statistics from the author's service at the Royal Infirmary of Edinburgh. As an introduction, a series of 1,254 peptic ulcers is gathered from the literature with a 7 to 14 year follow-up. Seventy-one per cent of these medically treated patients gave an unsuccessful response. It is estimated, however, that the operative mortality is now approximately 5 per cent and that the incidence of stomal ulcer is under 2 per cent, which would mean that only approximately 7 per cent should have unsuccessful treatment by surgery. It must be remembered that these figures refer only to patients admitted to the hospital. Many of the medically treated patients, although living several years after their original therapy, were chronic invalids. Since the incidence of recurrent ulceration and postgastrectomy disturbance is quite small, a larger proportion of the surgically treated group are happy grateful patients after the operative procedure.

Several indications for operation are listed. Since gastric ulcer carries such a high danger of malignancy, it should be managed surgically if it occurs in a patient over middle age or does not respond immediately to medical management. The location of an ulcer on the posterior aspect of the duodenum, penetrating into the pancreas and present for a long period of time, requires surgery. Operation is indicated if a relapse occurs within 2 or 3 months of effective medical management and the symptoms are

severe. Occasionally, pain is so severe and consistent that the patient practically demands surgery. Sometimes economic and social factors play a large part in the decision for surgery. The professional man may be able to live with his ulcer, but the laboring man frequently cannot adhere to a prescribed diet. This type of individual should be given the advantage of surgery.

A secondary or anastomotic ulcer always requires surgery whether it follows gastroenterostomy or partial gastrectomy. Immediate operation is still preferred in perforated ulcers. This consists only of closure of the perforated area. The recurrence of symptoms after one perforation is usually regarded as an indication for elective gastrectomy. Gastrojejunocolic fistula likewise requires surgery.

The argument for and against the surgical management of hemorrhage from ulcers is discussed. Among 200 cases of bleeding peptic ulcer seen between 1946 and 1949, there were 13 deaths, a mortality of 6.5 per cent. Only about 5 per cent of the cases were referred for emergency surgery. The importance of early operative intervention is emphasized. Emergency surgery is indicated (1) in those patients under 50 years of age who continue to bleed or have recurrence of massive hemorrhage under treatment; (2) in those patients over 50 years of age who have a hemoglobin under 50 per cent or evidence of hemorrhagic shock on admission; and (3) in those patients who are over 50 years of age and have bled recently enough to be reasonable surgical risks. It is pointed out that recovery from two large hemorrhages or recovery from one large hemorrhage in a patient over 45 years of age indicates operation.

Resection of at least two-thirds of the stomach by some modification of the Polya operation with retrocolic anastomosis is suggested. Among 150 cases of gastrectomy only 2 patients were incapacitated for work by postgastrectomy difficulty.

Vagotomy is the treatment of choice for gastrojejunal ulceration after partial gastrectomy and for stomal ulcers following gastroenterostomy. Forty-one patients with duodenal ulcer were treated with vagotomy and resection of the distal portion of the stomach with 1 death. However, postoperative upsets were rather common, and therefore this procedure is not a favored one. CURTIS ARTZ, M.D.

**Displacement of the Stomach by Large Tumors in the Upper Quadrants of the Abdomen** (Gli spostamenti dello stomaco nelle grandi tumefazioni cresciute nei quadranti superiori dell'addome). WALTER GALLUZZI. *Chirurgia*, 1949, 4: 367.

Physical signs alone do not always make it possible to determine whether a large tumor occupying the upper abdomen is of visceral origin and whether its location is intraperitoneal or extraperitoneal.

Roentgenograms taken in anteroposterior and left lateral directions are of great diagnostic value in such instances.

The author reproduces images of the stomach under normal circumstances, as well as of disfigurements of this organ caused by an enlarged spleen, enlarged left lobe of the liver, a tumor on the inferior aspect of the right lobe of the liver, and a retroperitoneal tumor within the transverse mesocolon.

JOSEPH K. NARAT, M.D.

**Gastroesophageal Leiomyoma** (Il leiomioma gastroesofageo). LEONIDA MANZOCCHI. *Chirurgia*, 1949, 4: 349.

Only 5 cases of gastroesophageal leiomyoma could be collected from the literature by the author and he adds 1 case of his own.

A girl 12 years of age developed severe pain in the right dorsal region, without fever, 9 months before entry. Repeated roentgenograms of the chest and thoracocentesis furnished negative results. Right interlobar pleurisy was diagnosed. The pain gradually subsided but slight cough and dyspnea persisted. The patient was admitted because of recurrent pain in the epigastric region of recent origin.

A hypophonetic zone was extending from the fourth rib on the right side to the base of the lung and from the paravertebral line to the midaxillary line. Opacity in the same region was visible in roentgenograms. The roentgenological diagnosis was echinococcus cyst or bronchial cyst.

Exploratory right posterior thoracotomy revealed an ovoid mass, the size of a man's fist, with a smooth surface and parenchymatous consistency, covered with the mediastinal pleura. Dissection of the tumor demonstrated its continuity with the esophagus. The abdomen was opened through an upper midline incision. The juxtacardiac portion of the stomach was infiltrated by the tumor mass. The stomach was freed, the pyloric and right gastroepiploic arteries being preserved, and was pushed upward into the right thoracic cavity. The tumor was excised, and the lower third of the esophagus was anastomosed to the middle third of the stomach. Terminolateral intrathoracic esophagogastrostomy was accomplished on the right side, the walls being sutured in 2 layers. Penicillin and a sulfonamide preparation were placed into the right pleural cavity, and a drain was inserted through the ninth intercostal space.

The patient succumbed to bronchopneumonia on the sixth postoperative day. The histologic diagnosis was: concentric gastroesophageal leiomyoma.

Two groups of gastroesophageal leiomyoma may be distinguished: diffuse or concentric, and circumscribed or nodular. While simple enucleation may be considered when dealing with the nodular form, left transthoracic gastroesophageal resection and gastroesophagostomy is the method of choice in the diffuse form. JOSEPH K. NARAT, M.D.

**The Esophageal Propagation of Gastric Cancer. Its Clinicosurgical Significance** (La propagacion esofagica del cancer gastrico. Su importancia clinoquirúrgica). ABEL N. CANÓNICO and OSVALDO EGUÍA. *Prensa méd. argent.*, 1950, 37: 1112.

Fourteen cadavers with cancer of the cardia, fundus, or superior third of the stomach were ex-

amined. In all of these the lesion had not been interfered with by surgery or other forms of treatment. In 9 of these 14 specimens (67 per cent) the malignant growth had spread to the esophagus, and the disseminative process had extended up the wall of the esophagus for a distance of as much as 10 cm.

From these studies the authors conclude that there are three methods of extension. The first method is that of continuous lymphatic permeabilization. The modus here is the extension of cellular chains of cancer cells through the lymphatics until a favorable location for further development is reached. The original process may remain in contact with the primitive growth or may break connections with the formation of a local nodule. The second method is that of lymphatic embolism, or discontinuous metastatic dissemination. The third method is that of spread by contiguity. In the cases of undifferentiated cancer cells (linitis plastica) the spread may produce a rather even distribution in the submucosa, or even in all the layers of the esophagus, resembling the same process in the stomach itself.

In the last method of spread all layers of the esophagus tend to be involved, while in the first two the spread is usually submucous, just under the epithelium. In these two processes the epithelial lining of the esophagus tends to be elevated in nodular masses, free of ulcerative manifestations as a rule.

From the studies here reported and from a study of the figures given by surgeons as obtained from operations, a certain parallelism between the two sets of figures is observed and the authors are thus led to the conclusion that the propagation of gastric cancer toward the esophagus evidences a closer relationship to the topography of the malignancy in the stomach than to the advanced or terminal stage of the disease.

Be as it may, the sense of touch is not sufficient for judging the level of extension into the esophagus of the cancerous lesion of the cardial region of the stomach. In such a case a careful preliminary roentgenologic and esophagoscopic examination should be made of these patients. The esophagoscope is doubly valuable in that it permits of the demonstration of a certain rigidity of the esophageal wall in these cases and in that it permits the taking of biopsy specimens. Finally, during the operation histological examinations should be made by means of frozen sections. JOHN W. BRENNAN, M.D.

**Sarcoma of the Stomach.** SAMUEL F. MARSHALL and WILLIAM A. MEISSNER. *Ann. Surg.*, 1950, 131: 824.

Sarcoma of the stomach is not a common neoplasm, and the great majority of cases are not diagnosed before operation. The ratio of gastric sarcoma to carcinoma is 1 to 28.

Sarcomas of the stomach may arise, theoretically, from any mesenchymal tissue, but except for those arising from smooth muscle and from lymphoid tissue, they are so rare as to be considered curiosities. The leiomyosarcomas may be present in any portion of the stomach, are usually well circumscribed, grow predominantly into the gastric lumen, and usually develop focal areas of necrosis. The lymphoid tumors may be present in any portion of the stomach, are usually larger than smooth muscle tumors, and are more likely to grow in the same plane as the gastric wall rather than into the lumen. The typical appearance of a lymphoid tumor is that of a large flat mass, usually with an extensive shallow ulceration centrally.

The cause of sarcomas is unknown. They appear more often in males, and in a younger age group than do carcinomas. Sarcoma of the stomach presents no characteristic clinical features and in general the symptoms are similiar to those accompanying gastric carcinoma, with the one exception that the patients are not as cachectic and anemic as those with carcinoma.

Diagnosis is aided by the roentgenogram and the gastroscope, as well as by frozen section at the time of operation. Treatment is radical surgery followed by deep irradiation when the tumor is one arising in the lymphoid tissue. The survival rate is better than that of gastric carcinoma. The 5 year survival rate for leiomyosarcoma was 67 per cent, and that for tumors developing from lymphoid tissue, 44 per cent.

ELY ELLIOTT LAZARUS, M.D.

**Operative Accidents During 325 Vagotomies.** FRANKLIN B. WILKINS and JOSEPH WEINBERG. *Arch. Surg.*, 1950, 60: 1051.

The authors review the operative dangers in 325 consecutive vagotomies performed at Birmingham Veterans Hospital from 1946 to 1949. In the literature are reports of a death on the operating table as a result of an abnormal vagal reflex, a cardiac arrest which occurred during a transthoracic vagotomy, and inadvertent perforation of the stomach during dissection.

During 258 transabdominal vagus resections, the following accidents occurred: stomach perforation in 1 case, laceration of the esophageal musculature in 1 case, and penumothorax in 2 cases. Retractor trauma was responsible for mild bleeding from splenic vessels not requiring splenectomy in 3 cases, and small lacerations of the liver in 2 cases. In 67 transthoracic operations, the only operative accidents were fractured ribs in 6 cases, which occurred when the intercostal incision was spread with the Finochietto retractor.

The nerves were not injected with procaine hydrochloride before resection. In 14 cases, electrocardiographic tracings were made during vagotomy. Thirteen were normal, and 1 showed a wandering pacemaker with marked bradycardia when the right vagus nerve was sectioned. In this series there was one postoperative death from pneumonitis, and no operative deaths. Accidents in transabdominal vagotomy may be reduced by using gentle finger dissection about the esophagus while locating and removing segments of the nerves, by identifying and avoiding the blood vessels on the abdominal surface

of the diaphragm anterior to the hiatal ring, by avoiding sharp dissection in the mediastinal region, and by obtaining adequate exposure with a generous incision and satisfactory relaxation.

CURTIS ARTZ, M.D.

**Incidence of Hiatus Hernia in Patients Without Symptoms.** IRVING B. BRICK and HAROLD I. AMORY. *Arch Surg.*, 1950, 60: 1045.

In the evaluation of the clinical significance of esophageal hiatus hernia, the question of how frequently this lesion exists without symptoms assumes considerable importance. In a previous study hiatus hernia was the second most frequent diagnosis made for 3,448 patients undergoing roentgenologic examination of the upper gastrointestinal tract. Duodenal ulcer was diagnosed in 705 patients while hiatus hernia was present in 308 patients. Eighty-two per cent of the patients with hiatus hernia were more than 50 years of age.

Most of the studies of hiatus hernia are carried out in clinics or hospitals at which the patient presents himself because of symptoms. Few reports are available which state that hiatus hernia was specifically searched for in patients without symptoms. In this study, 300 ambulatory patients over 50 years of age, from the U.S. Soldiers Home, Washington, D.C., were examined roentgenologically for hiatus hernia. Positional techniques to discover a maximal number of such lesions were applied. Only 4 hiatus hernias, 2 of small and 2 of moderate size, were discovered. This is an incidence of 1.3 per cent, which compares favorably with other reports of 1 per cent of asymptomatic patients. However, this is in marked contrast with the incidence in groups of symptomatic patients, approximately 9 per cent of whom had hiatus hernias.

The finding of an incidence of approximately 1 per cent is emphasized since the study was made in the age group in which the lesion predominates, and with a technique which reveals a maximal number of hiatus hernias. The study does not prove, but does suggest that the finding of a hiatus hernia in patients with symptoms cannot be treated lightly. It should be evaluated after a careful search for other lesions of the gastrointestinal tract has been made. Careful clinical evaluation is required before the discovery of a hiatus hernia is dismissed as of no consequence.

CURTIS ARTZ, M.D.

**Preliminary Report of a New Method of Intestinal Intubation with the Aid of a Flexible Stylet with Controllable Tip.** GRAFTON A. SMITH and EDWIN L. BRACKNEY. *Surgery*, 1950, 27: 817.

The authors present a technique of rapid intestinal intubation using a flexible stylet with a controllable tip and inserting it into a koroseal tube. The method has been used successfully and to advantage in a series of 22 patients requiring intubation.

The stylet is composed of a heavily constructed coil spring with a controllable tip at its end. The latter is controlled by a handle and thumb lever so that the tip may be moved through an arc of 180 degrees. The tube is made of koroseal; it is 9 feet long with a lucite plug in its end. A latex balloon is attached just behind the lucite plug. Four feet 9 inches from the plug, a hole is cut to admit the stylet. Illustrations of the stylet are in the original paper.

The stylet and tube are passed fluoroscopically and the method of introduction is described. Details of construction and of the technique of passing the instrument are better secured in the original article.

The authors believe the procedure to be a better and easier approach to intestinal intubation in many patients.

DONALD C. GEIST, M.D.

**The Surgical Significance of Anomalies of Intestinal Rotation.** CLARENCE E. GARDNER, JR. *Ann. Surg.*, 1950, 131: 879.

Intestinal rotation is the process which corrects the position of the intestinal tract of the early embryo from a straight structure suspended on a common dorsal mesentery in the sagittal plane to the position seen in the normal child at birth.

This rotation occurs in three stages. The first stage consists of a contraclockwise rotation of 90 degrees of the intraumbilical loop of bowel, and occurs at about the eighth week of intrauterine life. Omphalocele, amniotic hernia, or exomphalos is the only anomaly in this stage. To prevent evisceration it is necessary to close the defect very soon after birth.

The second stage is the most important stage of intestinal rotation. It occurs rapidly, at about the tenth week of intrauterine life, and consists of the return of the midgut loop to the peritoneal cavity from the temporary position in the umbilical herniation and, at the same time, rotation of an additional 180 degrees in a contraclockwise direction. Anomalies of the second stage of rotation include nonrotation, volvulus of the midgut, malrotation, internal hernia, and reversed rotation.

The third stage is characterized by descent of the cecum and fixation of the mesentery of the cecum and ascending colon in the right flank. Anomalies of the third stage include subhepatic cecum, retrocecal appendix, and mobile cecum.

Some of these anomalies may exist without symptoms and be detected only incidentally on x-ray examination, at operation, or when a diseased organ is found in an anomalous position. If symptoms occur from the abnormality of rotation and fixation, the usual ones are those of partial or complete obstruction. Surgical correction of the abnormality, if necessary, is indicated immediately after birth.

ELY ELLIOTT LAZARUS, M.D.

**The Surgical Treatment of Diverticulitis.** BENTLEY P. COLCOCK. *Surg. Clin. N. America*, 1950, 30: 911.

The author presents a discussion of the principles of diagnosis and the surgical treatment of patients with diverticulitis of the colon, based on his experience with 50 patients. It is of interest that only 3 of his patients were under 40 years of age and that 44

per cent were over the age of 60. He favors consideration of operative treatment of any patient who has had severe recurring attacks of diverticulitis, without waiting for specific complications for which surgery has traditionally been recommended. In the present series, 66 per cent of the patients were admitted because of intestinal obstruction, 14 per cent because of external fecal fistula following the incision and drainage of an intraperitoneal abscess, and 14 per cent because of colovesical fistula.

With regard to diagnosis, the author stresses the difficulty of excluding carcinoma with certainty in patients who present themselves with diverticulitis, and refers to Pemberton's series of 289 cases, in 25 per cent of which the diagnosis was in doubt preoperatively. According to the reviewer's recollection, Brown, also at the Mayo Clinic, in another paper covering part of the same series of patients described by Pemberton, stated that the incidence of carcinoma in patients with proven diverticulitis of the colon was 2 per cent. The similarity of the clinical picture is notorious, and the author stresses the difficulty of sigmoidoscopic examination to the full length of the instrument in the presence of peridiverticulitis.

Operative treatment is performed in a two-stage procedure, colostomy being the first stage with simultaneous drainage of any abscess that may be coincidentally present. Excision of the affected loop is performed at the second stage with end-to-end anastomosis and closure of the fistulous opening into any other viscus being performed at the same time. Closure of the colostomy is not performed until injected barium, after a period of approximately 3 weeks, has proved that there is no extravasation of barium at the site of anastomosis. The author, like others, has frequently seen reactivation of diverticulitis where simple closure of diversionary colostomy was performed without resection. The length of time between diversionary colostomy and resection will depend upon the certainty with which the presence of carcinoma can be excluded. Where the likelihood of carcinoma is remote, the author prefers to wait 3, 6, or even 12 months before performing resection, in order to allow for full resolution of the inflammatory process and the disappearance of peridiverticulitis. Temporizing should not be risked if the likelihood of carcinoma seems considerable, and exploration and resection should be carried out within 6 weeks in such cases. The author recommends wide, rather than limited, resection of the diverticulum-bearing segment of the colon, the sigmoid being the portion involved in about 85 per cent of patients. WILLARD BARTLETT, JR., M.D.

**Factors Responsible for Improved Results in the Management of Acute Intestinal Obstruction.** CHARLES W. MCLAUGHLIN, JR., and JOHN H. BRUSH. *Arch. Surg.*, 1950, 61: 115.

This study concerns 205 patients with acute intestinal obstruction, who were treated at the University Hospital, Omaha, Nebraska. In the first group, 80 patients were treated between 1935 and 1942 with a mortality of 20 per cent. In a second series of 125 patients observed during the period between 1946 and 1949, the mortality was reduced to 8.8 per cent.

Mechanical adhesions accounted for 33 per cent of the cases; strangulated hernias, for 20 per cent; obstruction due to new growth, 18 per cent; inflammatory lesions, 14 per cent; and intussusception, congenital malformations, volvulus, and foreign bodies for the remaining 15 per cent. Approximately half of the patients were in the age range between 1 and 60 years, while the remaining half were very young or elderly.

Surgical decompression was carried out in 25 per cent of the cases. It was practically always necessary in cases of acute obstruction of the large bowel, and was accomplished either by a cecostomy or transverse colostomy. A Witzel type of ileostomy for decompression of distended small bowel was required in 9 patients in the earlier series. However, since the more successful use of intestinal intubation, ileostomy has been required in fewer patients. It is emphasized that the increasing success of intubation occurred when the responsibility for passing the Miller-Abbott tube through the pylorus was transferred to the Radiology Department. Intubation of the duodenum under fluoroscopic control was accomplished in 3 to 6 hours.

Of the 66 cases of acute obstruction from adhesive bands, there were only 3 deaths, a mortality of 4 per cent. Strangulated hernias, which comprised 20 per cent of the entire series, were responsible for 12 per cent of the overall mortality. The mortality among 35 patients with acute colonic obstruction from a malignant process was 20 per cent. There was a 35 per cent mortality in 14 infants with congenital defects. A distressingly high mortality of 37 per cent was seen in intussusception. It is pointed out that shock following prolonged manipulation in intussusception is most difficult to manage in small infants. The opinion is expressed that small children will stand a prompt resection for intussusception better than prolonged traumatizing manipulation.

It appears that the striking reduction in mortality stems from earlier diagnosis, prompt intubation in all cases of small bowel obstruction, utilization of the radiologist as a clinical consultant in executing prompt intubation of the duodenum, a better understanding of the use of fluids, whole blood, and antibiotics, prompt surgical decompression of all acute obstructions of the large bowel, and employment of enterostomy when intubation fails in cases of small bowel obstruction. CURTIS ARTZ, M.D.

**Experimental and Histologic Contribution to the Pathogenic Study of Intestinal Cystic Pneumatosis** (Contributo sperimentale e istologico allo studio patogenetico della pneumatosi cistica intestinale). V. STAUDACHER and A. BENCINI. *Chirurgia*, 1949, 4: 421.

By injecting colored fluid into the lymphatic system of hogs, the authors have demonstrated not

only that intestinal cystic pneumatosis is essentially a disorder of the lymphatics but also that it has, at least apparently, a pluricentric origin in the sense that numerous intestinal segments presenting the changes alternate with intact segments. An associated finding that is probably very important is that the villi with emphysema have a superficial epithelium with the characteristic histologic aspect of that in a state of rest.

By injecting gas into the intramural and subserosal lymphatic network of the intestine of the dog, it was demonstrated that it is possible not only to reproduce a moniliform aspect of the lymphatic capillaries and trunks similar to that of the initial stages of intestinal cystic pneumatosis, but also, by repetition of the injections in the same segment, to reproduce gaseous collections at the mesenteric insertion due to rupture of the lymphatic trunks, with a tendency toward the formation of autonomous cysts. In these attempts at experimental reproduction of the disorder, it was never possible to find emphysema of the mucosa with involvement of the chyliferous system at its origin in the villi.

The demonstration that in the hog the intestinal cystic pneumatosis originates in the villi proves that the lesion is not of mechanical origin, at least in this animal, and that there is no question of massive penetration of gas through a solution of continuity of the mucosa.

As to the question whether the pathogenic conditions encountered in the hog are the same as those which cause the disorder in man, it must be admitted that the mechanical theory, which would easily explain the rapid appearance and disappearance of the lesion, is not completely convincing. Therefore it is better to accept at least the possibility that the emphysema of the chyliferous vessels (which is substantially intestinal cystic pneumatosis) also has its origin in the villi in man. However, this still leaves unclarified the mechanism of the passage of the gas from the intestinal lumen to the central lymphatic system of the villus and some associated questions, such as the relative rarity of the disorder even in the hog, its short duration, and its appearance in various separate segments of the intestine. All the suppositions advanced as explanations are without basis of any sort.

The authors do not know what value these findings may have for the solution of the pathogenic problem of intestinal cystic pneumatosis, but they think that they cannot be ignored in further studies to clarify the subject. RICHARD KEMEL, M.D.

**Multiple-Balloon Kymographic Recording of the Comparative Action of Oral Administration of Atropine, Tincture of Belladonna and Placebos on the Motility of the Upper Small Intestine in Man.** WILLIAM P. CHAPMAN, EIRWYN N. ROWLANDS, and CHESTER M. JONES. *N. England J. M.*, 1950, 243: 1.

The comparative action of atropine, 0.45 to 0.6 mgm., given orally, and tincture of belladonna, 0.4 c.c. or 20 drops, on the motility of the upper small intestine in 14 healthy subjects is described. Motor activity was recorded with a multiple-balloon water-manometer system. The results are compared to similar studies with placebos.

Both drugs produced about a 100 per cent greater reduction in propulsive and total contraction than was observed after the administration of placebos.

"Tone," or the sustained tension of the bowel wall, was slightly diminished by tincture of belladonna. The results with atropine were not appreciably different from those noted with placebos.

Marked variation in motility from person to person and in a given subject from hour to hour would have made the assessment of drug effects difficult if placebo studies had not been used for the purpose of control observations. JOHN J. MALONEY, M.D.

**Roentgenologic Study of the Small Intestine in the Course of Diverse Affections** (Etude radiologique du grêle au cours de diverses affections). GEORGES DE BUSSCHER. *Acta gastroenter. belg.*, 1950, 13: 295.

Only that small intestine which presents itself to the roentgenologist by the fractionated filling method of Pansdorf is considered normal. Two hundred cubic centimeters of barium and milk mixture are given by mouth, followed by the same amount given in the same manner 2 hours later, which should produce a single band of shadow of uniform width. Of course, the jejunum presents a fine penniform appearance because of the mucous folds peculiar to this region, and the further reaches of the ileum appear more grossly nodulated in contour, yet there should be no constant narrowings of the general lumen and no constant dilatations. The author even believes that the segmentations of Cannon may be the initiation of a pathologic process.

When the functional manifestations of the small intestine toward disease are examined more in detail, however, it will be seen that roentgenology has less to offer than in the corresponding conditions in the stomach or even in the colon. In the roentgen symptomatology there is constant recurrence of the accelerated transit, the slowed transit or the unchanged transit time, the hypersegmentation, the hypertonicity, the hypermotility, or their opposites, the jejunization of the ileum, air bubbles, and discontinuity of the shadow band with flocculation and vague borders of the intestinal contents. These are functional symptoms and cannot of themselves lead to a precise diagnosis. The physician will have to seek patiently for the cause of these functional disturbances.

Nevertheless, despite the fact of the indefiniteness of these findings, a close study will frequently offer some clue as to the type of pathology at the bottom of the roentgenological manifestations. For instance, there will be very little roentgenological evidence of trouble in cases of ordinary banal intestinal catarrh; if there is evidence of motor dysco-ordination it, as a rule, points to an already far advanced infective process. The disturbances secondary to such con-

ditions as inflammation of the gall bladder will, as a rule, involve the entire tract of the small intestine, from the pylorus to the valve of Bauhin, and the same may be said of the motor disturbances secondary to hyperthyroidism; on the other hand, in the allergies the disturbed motor functions are apt to involve the middle and distal portions of the ileum. In the course of typhoid fever, and indeed in tuberculosis, the findings are apt to involve the terminal ileum and cecum.

Acute appendicitis will, of course, exercise a marked influence on the motor functioning of the ileum, and conversely, Crohn's terminal ileitis will show many findings involving the appendix and cecum.

Terminal ileitis, however, has a characteristic organic picture, like that of tuberculosis, and these more or less fixed findings permit a more precise diagnosis in these conditions, especially when the roentgenography is combined with other forms of clinical examination.

In tuberculosis, for example, the lesions in the small intestine are seldom primary as there will be lung and other findings as a rule. While it is true that the tuberculous ulcer is seldom seen directly (as a niche) in the small intestine, yet the swelling and edema of the surrounding mucosal pattern and the signs of hypersecretion of mucus and pus will have a more localized character. In terminal ileitis, the other condition which is apt to produce organic changes on a definite basis, the stenotic and ulcerative pattern is apt to be more continuous, involving solidly an extensive portion of the terminal ileum. In tuberculosis the satellite lymphatic apparatus is usually severely involved, which in time leads to a characteristic calcification of the neighboring lymph glands. In Crohn's terminal ileitis such lymphatic involvement is of little consequence.

In conditions lying entirely outside of the gastrointestinal tract (sympathetic dystonia, blood diseases, allergy, hyperthyroidism, or thyroprival conditions, and diseases of the female adnexa and of the genitourinary apparatus) other methods of examination and study will frequently confirm and refine the diagnosis, and even prevent errors in treatment. Little would be accomplished by removing an appendix for an allergic condition; however, much can be accomplished by desensitization procedures and by ferreting out the offending foodstuffs.

Much waits to be done, however, in these cases in the matter of special methods of roentgenologic examination. In addition to the usual peroral administration of the contrast mixture, a barium enema should be given and the results studied in complete filling of the colon and the terminal ileum, and in residual filling under graduated pressure conditions and under conditions of graduated compression. One roentgenographic exposure is not enough, a series of roentgenograms should be taken at definite periods and these should perhaps be supplemented by kymographic and even cinematographic procedures.

JOHN W. BRENNAN, M.D.

**Diverticula of the Small Intestine.** E. S. J. KING. *Austral. N. Zealand J. Surg.*, 1950, 19: 301.

This report deals with diverticula of the small intestine as found in postmortem examinations of adults. This type occurs usually in the mesenteric border of the jejunum but may also occur in the ileum. The diverticula found in young people are different from those found in other individuals. In young people the structures are usually single, the wall of the diverticula being of the same thickness as that of the neighboring bowel. The mucous membrane may be intestinal in type but is often gastric or may even contain pancreatic tissue. These diverticula occur on the mesenteric border. Any diverticula occurring on the antemesenteric border of the ileum or near it are assumed to be of Meckel's type. Diverticula in adults constitute the great majority of diverticula and vary in size from 2 to 3 mm. to 9 to 10 cm. in diameter. The smallest ones are overlooked as a rule. Most of the well developed diverticula are spherical. They are sometimes placed so closely together that as they enlarge they coalesce, but usually the line indicating the junction of the two is apparent. The majority of these diverticula are found at or near the mesenteric border. In the upper part of the jejunum the diverticula project more to the right side (anteriorly). In the lower part of the bowel diverticula are to be found arising from the bowel on both sides of the mesentery. In an occasional case diverticula arise from the antemesenteric border.

A vascular bundle consisting of artery and vein is found lying close to each diverticulum. When the diverticulum is at a distance from the mesentery the vessels run from the mesentery over the bowel wall and then over the diverticular wall. This need not mean that the presence of the vessel is a cause of weakness in the wall leading to the development of the diverticulum.

Associated conditions which have been found with small intestinal diverticula include lipoma, fibroma, pancreatic tissue, carcinoma, sarcoma, and inflammation. The most important complications are infection of the sac and its sequelae, traumatic rupture of the diverticula, and obstruction of the intestinal lumen. Hemorrhage has been observed and may be indicated clinically by hematemesis or by melena. In some instances this may be massive.

The various theories of the cause of these diverticula are presented, but it is admitted that there is insufficient evidence on which to base a complete hypothesis. The factor or factors responsible for the sacculations are still to be found. The observations related in this report are the result of the study of 32 postmortem specimens and 5 surgical specimens.

HAROLD LAUFMAN, M.D.

**Perivaterian Diverticulum** (Divertículo perivateriano). NEWTON BURLAMAQUI BENCHIMOL. *Rev. brasil. cirurg.*, 1950, 19: 59.

A series of roentgenographic reproductions show the constancy of the size and outline of the shadow

offset from the concave border of the second part of the duodenum. This finding was, of course, not considered pathognomonic of diverticulum, since one of the differential points between diverticulum and ulcer is the greater constancy of the latter. However, the findings indicated a pediculated lesion with great facility of ingress and egress of the shadow-casting medium.

There was enough antral change, suggestive of gastric carcinoma of the linitis plastica type, to justify an exploratory operation in the 70 year old patient (male) with rather mild gastric symptoms of 4 months' duration; however, the relatives of the aged patient refused to agree to laparotomy.

The diagnosis of perivaterian diverticulum was therefore based purely on roentgenological findings; however, the diagnosis of diverticulum in this region is, as a rule, purely a roentgenological problem as surgery here is but rarely indicated (hemorrhage, ulcer, malignant degeneration), especially in a patient as old and with as mild a type of symptoms as in the present case.

The author believes that perivaterian diverticulum is always congenital, that is, in the sense that there is a predisposition to the condition and not a lesion which is present at birth. This type of diverticulum is extremely rare in the newborn and the infant. Duodenal diverticula are diagnosed in 80 per cent of the patients more than 50 years of age.

Very few of these diverticula produce any characteristic symptoms and when they do they could just as well suggest a coexistent duodenal ulcer; indeed, in the present instance there were enough findings in the antrum of the stomach to explain the symptomatology. When symptoms are produced by the lesion it is usually the result of excessive dilatation or intrapancreatic extension. Retention of food, of course, favors ulceration (rare), diverticulitis, or peridiverticulitis. Malignant degeneration of a nature primary to the diverticulum has been reported only once (Morrison and Feldman).

JOHN W. BRENNAN, M.D.

**Two Extensive Interventions: Jejunostomy and Ileostomy** (Duas grandes intervenções: jejunostomia e ileostomia). ALFREDO MONTEIRO. *Rev. brasil. cirurg.*, 1950, 19: 41.

In using the above title the author does not mean to imply that the interventions are of difficult execution; in fact, when they are performed in the classic manner of the Witzel operation they are quite easy to do. The operations still have great value despite the widespread use of the Abbott-Rawson and the Miller-Abbott tubes.

The author practices jejunostomy in a number of other circumstances than the old, practically exclusive, indication of inoperable gastric cancer in which gastroenterostomy was impossible or inadvisable. In gastroesophageal anastomoses in which the patient does not tolerate the in-lying tube, the temporary jejunostomy is indicated as a complementary procedure to the main curative operation. It is too dangerous to allow the possibility that the patient may remove the tube himself despite the warnings of the surgeon. The same considerations apply in the cases of total gastrectomy. In these cases oral feedings may be resumed 12 days after the operation and the Witzel fistula will close of itself within 48 hours of the removal of the tube.

In the cases of duodenal fistula following gastric resection jejunostomy is a part of the treatment. For these patients parenteral feedings will not be sufficient and oral feedings through the fistula during the period of discharge will only aggravate matters. When the feeding is done through the Witzel fistula there will remain only the natural secretions of the stomach and duodenum to pass through the duodenal fistula, and this may be largely eliminated by continuous suction treatment.

The ileostomy, before the advent of the Miller-Abbott tube, was an absolute indication in high intestinal occlusion. The operation is still of great practical value in those instances in which the tube cannot be utilized. In many cases of ileus, even when occlusion is not at fault (dynamic ileus following intestinal resection), one cannot wait until the ameliorative effects of the Miller-Abbott tube can be procured.

The author reproduces from his textbook on surgery a series of illustrations of his own (Witzel) method and the method recommended by Wangensteen. He believes that the Wangensteen method is to be preferred if the decompression during the period of actual operation is sufficient, but when continuous suction will be required following the operation, the Witzel method as performed by the author is preferable. JOHN W. BRENNAN, M.D.

**The Ruptured Appendix.** C. HAROLD AVENT, CARRUTHERS LOVE, ROBERT NEWMAN, and MORTON J. TENDLER. *Surgery*, 1950, 27: 862.

A comparison of mortality rates in the past 2 decades in patients with ruptured appendix and peritonitis is presented. The first decade, 1929 through 1938, included 444 cases with 134 deaths, a mortality rate of 30.18 per cent. The mortality rate in the past decade, 1939 through 1948, has been reduced to 11.27 per cent, 61 deaths among 541 cases.

During the latter decade, there were 3,396 cases of acute appendicitis of all grades with 71 deaths, an over-all mortality rate of 2.09 per cent. Among these cases were 2,680 cases of acute diffuse appendicitis with 5 deaths from all causes, a mortality rate of 0.18 per cent; 175 cases of acute gangrenous appendicitis with 5 deaths, a mortality rate of 2.85 per cent; and 130 cases of appendical abscess (included in the perforated series), a mortality rate of 6.15 per cent.

Approximately one-sixth of all the patients admitted with a diagnosis of appendicitis in any grade had a ruptured appendix.

During the years 1947 and 1948, when penicillin and streptomycin were used extensively, there was but 1 death among 96 patients, a mortality rate of 1.04 per cent. SAMUEL KAHN, M.D.

**A Histological Evaluation of Appendectomy.** ORDE POYNTON. *Med. J. Australia*, 1950, 1: 691.

Histological examination of 1,000 appendices removed after a diagnosis of acute or subacute appendicitis showed this condition to be present in only 39 per cent.

While the diagnosis of acute appendicitis was established in 49.5 per cent of the cases among males, it was proved correct in only 27.5 per cent of the cases among females. There would appear to be scope for refinements in the differential diagnosis of this condition, with a view to reducing the number of operations performed.

Lymphoid hyperplasia without any evidence of acute appendicitis was found in 32 per cent of the appendices from female subjects, but in only 17 per cent of those from male subjects. The incidence was particularly high in females under 20 years of age (40%). It was suggested that local irritation due to ovulation may be a factor in the production of this condition, and that the tension produced in the appendix may be responsible for localized symptoms and signs.

The authors conclude with the observation that the etiological factors involved in the production of acute appendicitis remain obscure, and in view of the frequency of the condition they are deserving of further study. ELY ELLIOTT LAZARUS, M.D.

**Vascular Loops in the Appendices Epiploicae. Their Anatomy and Surgical Significance, with a Review of the Surgical Pathology of Appendices Epiploicae.** JAMES A. ROSS. *Brit. J. Surg.*, 1950, 37: 464.

A case is reported of a 47 year old woman who was operated upon for a painful swelling in the left groin. At operation a femoral hernia containing an incarcerated appendix epiploica was found. The appendix was large and swollen because of occlusion of its blood supply. It was excised after ligation of its base.

The author studied the vascular patterns in the appendices epiploicae of 25 cadavers. In some obese subjects the vasa recta of the colon formed loops in the subserous fat of the appendices, the heights of the loops being 1 or 2 mm. at the most. In these cases the vessels supplying the appendices arose from the apices of the loops. In no case was the loop of sufficient size so that it could have been involved in torsion of an appendix.

It is concluded from these studies that involvement of the vessels of the colon, with consequent gangrene of the colon wall, in diseases of the appendices epiploicae must be very rare. However, there is 1 case in the literature in which death was attributed to interference of the blood supply of an appendix epiploica resulting from torsion.

Surgical removal of appendices epiploicae by ligation at the base can be considered safe. However, one should avoid pulling the appendix away from the bowel before severance.

FREDERICK W. PRESTON, M.D.

**Acute Diverticulitis of the Cecum and Ascending Colon.** ERLAND SARTOR. *Acta chir. scand.*, 1950, 99: 485.

Because of the location of the vermiform appendix, operations in the right lower quadrant of the abdomen are more common than in any other part of the abdominal cavity. The finding of a normal appendix in a patient with suspected appendicitis necessitates a search for some other pathological condition. One disease that is encountered, though rarely, is acute diverticulitis of the cecum and ascending colon; however, even at operation, this condition is not always easily recognized. As a result, the procedure to be followed is difficult to determine. The author presents 2 cases.

The first case is that of a 37 year old woman who was operated upon because of the history and physical findings of acute appendicitis. A normal appendix was found. There was a firm mass the size of a grape in the colon near the ileocecal valve. In the lateral aspect of the colon, there was an opening that was first conceived as a crater. In this area there were a number of lymph nodes and the omentum was adherent. Malignancy was suspected and an ileocecal resection was done. Examination of the specimen, postoperatively, revealed a diverticulitis, and there was no evidence of malignancy.

The second case was that of a 32 year old woman who had had similar symptoms and was admitted to the hospital because of acute pain, mainly in the right lower quadrant, for a period of 1 day. Appendicitis was suspected and operation was decided upon. Operation disclosed a normal appendix. In the medial aspect of the colon immediately above the ileocecal valve was a hard, walnut-sized swelling which, on incision, was found to be a diverticulum containing a fecal stone. The diverticulum was extirpated. The histopathology is recorded as an inflamed true diverticulum.

Potier first described the operative treatment of this condition, in 1912, and the last report, of 100 cases, was published in 1947 by Anderson. The sex incidence is equal and the average age is 41 years. In nearly all the cases the preoperative diagnosis was acute appendicitis. The syndrome presented differed but slightly from that of appendicitis.

ROBERT E. FLORER, M.D.

**Rupture of the Bowel in the Newborn Infant; Including a Case Report of Rupture in the Large Intestine, with Recovery.** C. MARSHALL LEE, JR., and BRUCE G. MACMILLAN. *Surgery*, 1950, 28: 48.

The authors present the case of an infant with congenital atresia of a segment of large bowel, which produced intestinal obstruction and perforation of the cecum. It is believed to be the first reported case of perforation of the large bowel in a newborn infant, followed by recovery.

The most common causes of obstruction of the bowel in the newborn infant, leading to perforation, are atresia and meconium ileus. A study of the litera-

ture indicates that obstetrical trauma can be discounted as a cause. If atresia is present below the duodenum, resection and anastomosis is the procedure of choice even though the bowel distal to the obstruction appears too small to function. In perforation secondary to meconium ileus, resection of the devitalized bowel should be performed. If the bowel is viable, closure of the perforation is sufficient, but the distal bowel must be cleared of obstruction and steps must be taken to keep the bowel contents in a fluid state. Enterostomies and exteriorization procedures are not well tolerated by infants, and should be avoided.

The authors emphasize the importance of the procedure described by Webb and Wangensteen in dealing with the segment of bowel distal to an atresia. The distal segment should be isolated between rubber shod clamps, and air should be injected into the segment. This maneuver enables the operator to determine the limits of the atretic segment and the distensibility of the bowel distal to it, which may be suitable for an anastomosis.

FREDERICK W. PRESTON, M.D.

**Large Fecaloma at the Level of an Acquired Megarectosigmoid. Subtotal Resection of the Rectosigmoid. Recovery** (Volumineux fécalome au niveau d'un méga-recto-sigmoïde acquis. Résection subtotale du recto-sigmoïde. Guérison). D. GIRARD, PROTAR, FOUCHER, and VITTORI. *Mem. Acad. chir.*, Par., 1950, 76: 443.

One year following an attack of amebic dysentery, a soldier who had suffered since birth from chronic constipation, developed a syndrome of abdominal distention with constipation, persisting for 7 days and followed by a period during which his bowels moved once every 3 or 4 days. Shortly thereafter, a movable, painless tumor, the size of an egg, appeared in the right iliac fossa, increasing progressively in size to that of an infant's head. Roentgen examination showed the tumor to be located in the higher rectum and lower portion of the elongated sigmoid loop. The colon above the tumor appeared normal. Operation revealed an enormous fecaloma, which was removed by colotomy. Within 6 months, another tumor the size of a fist had developed in the same region. With a diagnosis of fecaloma at the level of the mesosigmoid, the previous operative scar was resected and another fecaloma was removed through a median subumbilical incision with a subtotal resection of the sigmoid and division of the rectum above the base of the cul-de-sac of Douglas, leaving 3 cm. of peritonealized intestine of normal diameter. Intestinal continuity was insured by invagination of the end of the sigmoid into the rectum, with a drain through the anus.

The postoperative course was smooth at first, but became complicated on the tenth day by a hypogastric fistula, the discharge from which subsided after a few days, and by the fifteenth postoperative day the patient was on a normal diet and his general condition was improving rapidly. Two months later, he was admitted for a fistula in the lower portion of the surgical scar, communicating with the sigmoid loop, but having no relation to the colorectal anastomosis. Following exploration of the fistula, cicatrization was obtained and the patient regained his health.

The megarectosigmoid in this case was apparently acquired and secondary to a congenital dolichosigmoid, the function of which had been disturbed by amebic dysentery. The direct sigmoidorectal anastomosis without the institution of an artificial anus is a valuable intervention which obviates the time required for closure of the colostomy, but can be employed only if a collar of peritoneum has been preserved in the lower rectum. The use of a transanal drain prevents the two tubes from telescoping and relieves the strain on the sutures.

EDITH SCHANCHE MOORE

**Conservative Surgery in the Treatment of Rectal Cancer** (La chirurgie conservatrice dans le traitement du cancer du rectum). F. D'ALLAINES, CH. DUBOST, and RENAULT. *Sem. hôp. Paris*, 1950, 26: 1735.

In 15 years the authors have seen 350 cases of rectal cancer. Gradually their percentage of operability has increased and they have extended the radical operation to tumors which have passed the limits of the rectum and involved the prostate gland, bladder, vagina, and ureter. Of 131 patients with this condition seen in the last 2 years, 117 (89.3 per cent) were submitted to a radical operation: conservative resection was used in 78 (66.6 per cent), and amputation in 39 (33.3 per cent). The percentage of resections has tended to change at the expense of the mutilating operation during the last months. The conservative operations were performed according to two techniques: abdominosacral resection in one stage, and Babcock's operation, which was reserved for special cases. All patients received careful local and general preoperative preparation and postoperative care; spinal anesthesia was given preference over general anesthesia. The colostomy was punctured on the second day to allow the evacuation of gases, and in most cases it was not opened again; it was closed from 2 to 3 weeks after discharge of the patient.

The early postoperative mortality in 202 abdominosacral operations was 14 (6.9 per cent) and was due to heart failure, pulmonary complications, hemorrhage, or septicemia. The late postoperative mortality (between 3 weeks and 4 months) was 10 (5 per cent) and was due to rapid pulmonary metastasis or progressive cachexia. In 42 Babcock operations these respective mortalities were 4 (9.5 per cent) and 1 (2.3 per cent), the causes of death being the same as in the abdominosacral operations.

Survivals were about the same for both operations. For the abdominosacral operation, 88 per cent of 178 patients survived at the end of 1 year, 55 per cent of 132 at the end of 3 years, and 50 per cent of 64 at the end of 5 years. For Babcock's operation,

60 per cent of 42 patients survived at the end of 1 year, 56 per cent of 32 at the end of 2 years, and 54 per cent of 22 at the end of 3 years. In the 2 operations, metastasis was the cause of death in 26 and 29 per cent, respectively. Local recurrence was the cause of death in 6.8 and 8 per cent, respectively.

Fecal continence was generally obtained after the abdominosacral operation: in 178 patients, results were excellent in 78 per cent, average in 19 per cent, and bad in 3.3 per cent. After Babcock's operation, in 38 patients, results were excellent in 10.8 per cent, average in 62 per cent, and bad in 29 per cent. In most cases, the functional result was acquired in from 3 to 4 months, while the normal frequency of defecation was recovered more slowly. Naturally, results varied with the age of the patient: between 20 and 60 years the percentage of good functional results varied from 70 to 100, while after 65 years the chances of a good result fell to 35 per cent. Fecal continence was in direct proportion to the height of the preserved rectal tube. With 1 cm. of rectum, results were good in 55 per cent, poor in 40 per cent, and bad in 5 per cent. With 3 cm. of rectum, results were good in 70 per cent, poor in 26 per cent, and bad in 4 per cent. With from 7 to 8 cm. of rectum, results were good in 100 per cent. This seems to explain why the best functional results are obtained after abdominosacral resection, since in Babcock's operation it is difficult to preserve a significant segment of the rectum and, even if this were possible, the segment would be torn up by the maneuvers required by the endoanal stage.

The authors accept the following operative indications. Any tumor of the rectum located 10 cm. or more above the anus should be resected by the abdominosacral route, with an artificial anus of short duration, and especially if difficulties are expected in the pelvic region. If there are difficulties, the perineococcygeal or even the perineosacral approach provides an excellent exposure to take care of any pelvic obstacles which are hard to overcome by the high route, especially in case of a large tumor. However, Babcock's operation is reserved for (1) tumors located from 6 to 10 cm. from the anus when they are small and the subject is not too young (the malignancy of these tumors in the young and their frequency of local recurrence impose wide amputation), and (2) very old subjects or patients with metastasis in whom it is important to obtain complete cure in a minimum of time without a temporary artificial anus which prolongs the postoperative care.

RICHARD KEMEL, M.D.

**The Significance of Chronic Focal Infection in the Treatment of Surgical Diseases** (Die Bedeutung chronischer Infektionsherde fuer die Behandlung chirurgischer Erkrankungen). H. W. PAESSLER. *Deut. med. Wschr.*, 1950, 15: 674.

The author's father, Hans Paessler, was about to publish his experiences with focal infection as the cause of disease when an air raid on Dresden took his life. He had always struggled against the abuse of this conception of focal infection, but the youthful and inexperienced workers, especially in America, immediately seized upon the idea as a solution for all their problems. The Mayos had introduced the theory in America, but unfortunately the valuable experimental work, such as that on the Streptococcus by Rosenow, was never brought to clinical fruition, and conditions soon got out of hand.

The author, who is a surgeon, would naturally be sensitive to the possibilities for good in the theory concerning focal infections; however, he does not believe that focal infections in themselves are the causative agents in the production of disease. He thinks that the toxins—the author does not believe in the transmission of the organisms here concerned from the focus by way of the blood stream or otherwise—have an indirect effect by upsetting the normal metabolism maintained by the hormones and by the tone of the sympathetic nervous system. Thus, the removal of the focus may or may not remove the true sympathetic nervous or hormonal cause of the complaint.

Difficulties in the treatment of focal infective processes lie in the trouble required to uncover the lesions, in the inability to determine precisely the role of these lesions in the affection, and, finally, in the economic aspects of the problem. The causative focus will often be discovered only by careful examination of the patient, by a careful consideration of the general economy and habitus of the patient, and, well, by "luck." The tonsillar crypts will contain virulent streptococci and the subject will be perfectly well, or the contents expressed from the crypts will be sterile but when the tonsil is removed deep abscesses will be found. The same general remarks will apply to the roentgen examination of the teeth. So many other causative factors may be present that the effects of removing the infective focus cannot be predicted. The author cites the case of a pregnant woman with hyperthyroidism of so severe a type that the attending physician sent the patient in for thyroidectomy, yet the almost immediate abortion resulted in dramatic relief. Finally, the economic condition of society, especially in Germany, practically inhibits routine examination of every sick person for every possible source of focal intoxication.

With reference to the responsibility of the surgeon in this matter, the author believes that he should always be on the watch for the presence of focal infection, especially in patients who show a marked degree of sympathetic nervous instability. Gastric and duodenal ulcer, and the inflamed colon or gall bladder should not be subjected to mutilating surgical procedures until every other possibility is exhausted. The infective focus should not be acted upon without removal at the same time of every possible adjuvant causative factor (nicotine, alcohol).

The ideal, of course, would be to free every patient from every source of focal poisoning. However, here the question arises: Who is going to foot the

bill? In the field of expert testimony in medicolegal cases this subject must be given consideration. In the typical bone changes of pneumatic hammer injuries it would be wrong to deny the sufferer compensation because he also presented symptoms and signs of chronic arthritis. It would also be wrong to put the insurance company to the expense of dental care in simple injuries which experience shows will heal without incident. However, the case would be different in the rheumatic periarthritis of the shoulder resulting from the occupational injury and in the postcommotional disturbances which are not adequately explained or which are atypical in their manifestations. In these instances and in the presence of a negative Schellong test (Tœnnis), the removal of possible focal infections must be recommended and effectuated, if possible, through the intermediation of the insurance carrier.

The question of focal infection is here called to the attention of the surgeon, who by collaboration with the internist, the otologist, and the dentist may procure results frequently far exceeding the possibilities of his own specialty. JOHN W. BRENNAN, M.D.

## LIVER, GALL BLADDER, PANCREAS, AND SPLEEN

**Fatal Hemorrhage by an Unusual Erosion of the Portal Vein** (Toedliche Blutung durch eine ungewoehnliche Pfortaderarrosion). ADALBERT JANSEN. *Deut. Gesundhwes.*, 1950, 5: 434.

The author reports the case of a woman of 58 years who suffered from chronic cholecystitis and cholelithiasis. Following an attack of gall-bladder colic, the patient developed severe melena and extreme icterus. She expired 12 days after onset of the symptoms.

The autopsy revealed a number of stones, one of which, at the gall-bladder neck, had eroded the left branch of the portal vein. In addition, there was an ulcer at the base of the gall bladder, which had perforated into the transverse colon. The common bile duct was completely blocked by another stone. The fatal hemorrhage had taken its way from the eroded portal vein into the colon via the gall bladder.

WERNER M. SOLMITZ, M.D.

**Modern Aspects in the Surgical Treatment of Diseases of the Liver and the Bile Tract** (Ueber moderne Gesichtspunkte in der chirurgischen Behandlung der Erkrankungen der Leber und der Gallenwege). FR. BERNHARDT. *Deut. med. Wschr.*, 1950, 75: 760.

The author (deceased), previously director of the Department of Surgery of the University Hospitals at Giessen, Germany, selected a number of topics dealing with surgery of the liver and bile tract for this article. Only a part of these can be reported in this abstract.

In more than 90 per cent of cases the treatment of hepaticocellular icterus is within the domain of internal medicine. Surgery is indicated only as a last resort in cases in which medical treatment of many weeks' duration has been unsuccessful, toxic symptoms develop, no bile is secreted, and in which the TakataAra test gets more and more positive. In acute and subacute atrophy, all surgery is contraindicated.

Sometimes, however, drainage of the bile tract has a dramatic effect, even in desperate cases. Three methods are possible: either a cholecystostomy with external drainage, or an anastomosis between the gall bladder and the stomach or duodenum is performed, or the choledochus is incised and a drain advanced from the incision into the hepatic duct.

Why this drainage sometimes gives miraculous results in desperate cases of hepatogenic icterus is still an open question. The author discusses two possibilities: one is that the suction effect and the relief of pressure produced by the drainage causes stimulation of liver function; the other possibility is that irritation of the vegetative nervous system by laparotomy and manipulation at the hepatoduodenal ligament has a beneficial effect on liver function. This theory is corroborated by the observation that simple explorative laparotomy without any surgery on the bile system caused, in some instances, a spectacular improvement of hepatogenous icterus. The author saw also some improvement by novocain block of the right splanchnic nerve, and suggests that this simple method be tried before surgery is decided upon.

Sometimes it is impossible, even with the most modern laboratory methods, to differentiate between an obstructive and a hepatogenous icterus. In such cases the author incises the gall bladder fundus under local anesthesia and injects contrast material through the opening to determine, by cholangiography, the nature of the icterus.

Another interesting problem is the pathogenesis of infections of the bile tract. The author does not believe that ascending infection via the bile ducts plays any role. After choledochoduodenostomy, free reflux of the intestinal contents into the bile tract is the rule, as has been proved by numerous x-ray examinations. In spite of this fact, no infection of the bile system occurs even after many years of this open communication. In the majority of cases, infection probably occurs from the intestinal wall via the portal circulation.

An important form of inflammation that has been studied during the last two decades is caused by reflux of pancreatic juice into the bile tract. This can be proved by testing the gall bladder content for pancreatic enzymes which are sometimes present in high concentration. Anatomical studies have shown that in 70 per cent of all individuals pancreatic juice may flow from the duct of Wirsung into the bile tract provided that a spasm of the sphincter of Oddi is present.

In discussing colic attacks from cholelithiasis or cholecystitis, the author emphasizes the frequency of involvement of the pancreas. This can be tested by increase of diastase in the urine. It is very

important to test for this complication because, in poorly treated patients, acute necrosis of the pancreas may develop.

Pain, in colics as well as in postoperative conditions, is relieved immediately by novocain block of the right splanchnic nerve. In stubborn cases the nerve should be severed. Not infrequently, severe pain develops some time after cholecystectomy. This may be caused by constriction of the sympathetic nerves by scar tissue.

In cholecystectomy for stones, it is essential not to overlook the possibility of a stone lodging in the choledochus. In suspicious cases the duct should be explored by choledochostomy. It is desirable to perform a cholangiography during the operation to make certain that even small stones in the bile ducts are found. WERNER M. SOLMITZ, M.D.

**Clinical, Roentgenological, and Biochemical Study of a Case of Pseudocyst of the Pancreas Consecutive to an Acute Pancreatitis of Biliary Origin** (Etude clinique, radiologique et biochimique d'un cas de pseudo-kyste du pancréas consécutif à une pancréatite aiguë d'origine biliare). ROGER CRISMER. *Acta gastroenter. belg.*, 1950, 13: 383.

The patient was a 72 year old, large, obese countrywoman who had suffered a typical hepatic colic 6 years previously. Two years later a similar crisis occurred, and finally, a third attack took place a month before she was observed. This last biliary crisis was very severe and lasted for 3 or 4 days. It was accompanied by evidence of circulatory failure, a subicteric tint, and obstinate constipation.

At examination a fist-sized tumor could be palpated on the left side just under the costal border; the mass was immobile, smooth in outline, elastic, and painful to pressure.

Roentgenologic examination of the stomach and duodenum with the patient in an erect posture disclosed a shadow defect on the greater curvature, and with the patient in a recumbent position the defect was still present but the mucous plications in its region disclosed the characteristic concentric half circles suggesting that the defect was the result of an extrinsic mass pressing on the stomach walls from the outside. Ventral decubitus of the patient strengthened this impression. When the patient assumed a right oblique decubitus position the stomach was loosened from the mass and assumed a normal contour. The clinical diagnosis was therefore that of a retrogastric mass apparently involving the body or the tail of the pancreas.

In the bile secured by the Meltzer-Lyon method both lipase and trypsin were subnormal in amount and there was some hyperglycemia. Cholecystography indicated exclusion of the gall bladder. The diagnosis in accordance was therefore pseudocyst of the pancreas consecutive to acute pancreatitis of biliary origin. Operation disclosed a peritoneum involved in patches of steatonecrosis and, in the region of the pancreatic tail, a voluminous cystic pocket filled with a brownish liquid containing the debris of necrotic tissues. The contents of the sac were evacuated, a drain was placed, and the wound was closed. The patient, however, did not regain strength and died 15 days later.

JOHN W. BRENNAN, M.D.

**Acute Necrosis of the Pancreas.** YNGVE EDLUND. *Acta chir. scand.*, 1950, 99: 497.

Acute necrosis of the pancreas was first described in 1817. The pathological anatomy appears in different phases: acute edema of the pancreas, acute edema with fatty necrosis, hemorrhagic infarction, necrosis of the pancreas, sequestration, and the formation of abscesses. There are also three clinical phases: pain, ileus, and peritonitis. The author discusses the theories as to the cause of pancreatic necrosis.

The material in this article consists of 53 cases observed during the years 1943 to 1949. Thirty-eight patients were operated upon and 15 were treated conservatively. There were 20 deaths. In the first year, two-thirds of the patients died, whereas in the last year only one-fifth of the cases were fatal. The general clinical picture was that of severe pain in the epigastrium and radiating to the back, vomiting, and shock. The patients who were treated in the most recent years with a lower mortality rate were in just as severe a condition as those in former years. There was an increase of temperature in more than one-half of the cases. There was leucocytosis in less than one-half of the cases. An increase of diastase in the urine was found in 36 of 43 cases examined.

In about two-thirds of the cases, operations on the biliary tract were performed. The omental bursa was drained in 8 cases of the 13 in which the operation was laparotomy. Choledochotomy with drainage by means of a T-tube was performed in 18 cases.

Acute edema of the pancreas was found in 8 cases; edema with hemorrhage and fatty necrosis in 20 cases; hemorrhagic infarction in 2 cases; necrosis in 6 cases; and sequestration in 2 cases.

Acute pancreatic edema alone was not found in any of the cases which terminated fatally. Cholelithiasis was found in 16 of 38 patients operated upon. In most cases the wall of the gall bladder was thin without macroscopic inflammatory changes. Five patients presented stone in the common bile duct, localized at the papilla of Vater. Total biliary stasis was found in none of these cases. Two cases presented stone in the duct of Wirsung. Twelve patients of 33 have suffered relapse of their disease.

The most marked symptom in the series was pain, which was very severe, localized to the epigastrium, mostly to the left and with radiation toward the back. Only about one-fourth of the patients presented a picture of shock. The author believes that diastase examination of the urine is of value in the diagnosis and that this examination should be made within the first 36 to 48 hours. The diastase content of the urine increases later in the disease than does the blood amylase content, but the increased value of the urine diastase remains 24 hours longer.

Increased diastase levels in the urine were found in 22 of 28 patients operated upon.

From this series of cases it seems that the mortality in the operation of acute pancreatic necrosis is very high, whereas it is low in conservative treatment. The question of whether immediate operation is advisable at all if acute necrosis of the pancreas is diagnosed is discussed. The author questions the practice of incision of the pancreatic capsule because of the lobular arrangement of the organ. Of course, an operation cannot be avoided in some cases of uncertain diagnosis. In conservative therapy the following measures are suggested: continuous gastrointestinal suction, adequate fluid balance, adequate control of pain with drugs, paravertebral sympathetic block, or atropine sulfate, and possibly roentgen treatment.

In this series, relapse occurred in one-third of the patients. In attempting to prevent relapse, cholecystectomy and exploration of the common bowel duct should be resorted to in cases in which it is indicated by the biliary tract. Operation on the biliary tract is hardly to be considered in cases in which there are no clinical symptoms or in which there is no roentgen evidence of biliary disease. The association of alcoholism is mentioned and discussed. Abstinence from alcohol must be ordered to help prevent relapse. ROBERT E. FLORER, M.D.

## MISCELLANEOUS

**The Comparative Value of the Spontaneous Choice of Food by Animals and by Human Beings** (La valeur comparée du choix spontané des aliments chez l'animal et chez l'homme). H. CHAUMERLIÀC. *Acta gastroenter. belg.*, 1950, 13: 351.

As a clinical practitioner the author does not feel that she is capable of criticizing the vast amount of experimental work which has been done on the subject of the free choice of foods, therefore she will merely discuss briefly some of the results and attempt to evaluate them on the basis of her own clinical experience.

One thing is certain if the theory of the free choice of aliments has the validity attributed to it in many quarters, and that is that the crusades for the correction of human eating habits and the vast industries built to help in the realization of this aim are largely superfluous.

Supporters of the theory of spontaneous choice of alimentation have shown that animals know the medicinal value of certain plants: that hypernephrectomized rats prefer water containing salt (so essential to the nephrectomized) to pure water or to that containing sugar; that the hen swallows a calcareous bit of shell when she can; that the animal seldom eats more than corresponds to his energy demands; and that animals with severe grades of B-avitaminosis seem to exercise a selective preference for foods containing vitamin B.

Although it is not permissible to apply the results of animal experimentation directly to the human being, nevertheless the proponents of the theory of selective preferences in food matters claim to find these preferences also in the human being, particularly in the infant and in the primitive peoples of the world who may be presumed to live more nearly by instinct as apparently do animals. Thus the baby, when given free choice of as much milk as he wishes, will seldom (perhaps after a brief period of gluttony) take enough to do himself harm. Children suffering from rickets are said to develop a passion for eating chalk, and children who are convalescing from illness or operation, when given a free choice of a large variety of foodstuffs (as in the famed experiments at the Children's Memorial Hospital in Chicago), seem to exercise a beneficent good sense, or good instinct, in such matters.

Even in the adult city dweller instances of selective self alimentation have been adduced. Here, again, the adrenalectomized human subject or the subject with Addison's disease is said to develop a predeliction for salt and a distaste for carbohydrates. The subjects recovering from starvation in Europe following the Second World War (protein deprivation) have shown a tremendous predilection for meats. The repugnance of gall-bladder patients for fats is well known, as well as the repugnance of the cancer patient for meats, although in the latter instance the reason for this repugnance is not known, just as everything else about cancer is practically unknown.

To a certain point, of course, the operation of a selective preferment in the matter of alimentation can be admitted. Many ingenious suggestions have been profered to explain the *modus operandi* of this preferment. Of these the most complicated is probably that of Soulairac. This author postulated that there are certain nuclei of the hypothalamus which, together with the anterior lobe of the hypophysis, exercise extensive control over the organs which produce hormones and control the sympathetic nervous system, and it is this control which regulates the selective absorptive functions of the gastrointestinal tract and which controls the appetite, perhaps through some effect on the olfactory apparatus. The latter effect has received considerable substantiation from the observations on patients following puncture of the optochiasmatic cisternae. All these explanations suggest a simple physiopathologic mechanism, a simple chemotropism, or a simple neurohumoral regulation, both in the matter of selective preferment in foods in the animal and in the human being.

In general, however, the matter of alimentary selectivity must be in the human on a much higher level of intelligence than that admitted by these proponents and also than that admittedly at work in the animal. Even in the animal these instincts are not always infallible; for instance, the findings of Aschenasy-Lelu that experimental rats preferred saccharin water to pure water rather disposes of the claim of Richter that any liquid which an animal prefers to pure water must have some nutritional

value. This same writer reports extreme individual variation in the appetite of the rat toward protein foodstuffs. Seemingly irreconciliable with the theory of selective alimentary preference is the fact that the alcoholic will continue consuming alcoholic beverages to his destruction, the diabetic will persist in consuming sugar, and the patient with pernicious anemia is not especially drawn to the consumption of liver. Everybody knows how hard it is to prevent the child from putting anything and everything in its mouth, and how hard it is to persuade the child to eat a rational menu.

All in all the author believes that the human being is in large measure a dietary dub and in need of advice and guidance with reference to his eating habits. JOHN W. BRENNAN, M.D.

**The Fate of Blood Extravasated into the Peritoneal Cavity.** (Ueber das Schicksal des in die Bauchhoehle ergossenen Blutes). ARNOLD EHSER and OTTO SCHOLL. *Arztl. Forsch.*, 1950, 4: 265.

It is a known fact that after an intraperitoneal hemorrhage a great portion of the blood remains fluid.

The author attempted to answer the question as to whether the extravasated blood first coagulates and later becomes liquefied by fibrinolysis, or whether an inhibition of coagulation maintains the blood in liquid form.

Experiments on animals, such as the implantation of fibrin squares fastened to catgut in the peritoneal cavity of rabbits, and determination of the weight of the squares after various periods of time, showed that incoagulability of blood depends on proteolytic enzymes. They are responsible for disintegration of fibrinogen and secondary liquefaction of fibrin clots. Liquid blood obtained from the abdominal cavity was found to coagulate after the addition of fibrinogen. The enzymes derive from the serous fluid of the peritoneal cavity. Undoubtedly they also impair the function of other blood components.

It was also found that fat absorbs fibrinogens and thus prevents the coagulation of blood.

JOSEPH K. NARAT, M.D.

**Anatomicoclinical Contribution to our Knowledge of the Subject of Mixed Tumors of the Retroperitoneum** (Contributo anatomo-clinico alla conoscenza dei tumori misti retroperitoneali). CARLO BRUNI. *Lav. ist. anat. Univ. Perugia*, 1946, 5: 47.

The 45 year old male patient, a deaf mute since an attack of acute anterior poliomyelitis 8 years previously, had been carrying about a tumor of the right testicle for the past 5 years. For the past 10 months the tumor had been increasing in size rapidly but otherwise had caused no symptoms until the day of admission to the hospital, at which time the patient had experienced severe pain localized in the right inguinoscrotal region. While it is true that the testicular mass had not caused any symptoms ascribable to itself, nevertheless for some months the patient had been suffering from a dry cough and subfebrile temperatures with a conspicuous loss of weight. The patient was pale and complained of asthenia.

Physical examination revealed some findings in the lungs, especially accentuated on the right side, and a mass, the size of a newborn infant's head, in place of the right testicle. A semicastration on the right side was done successfully. Three weeks later the patient died with symptoms of dyspnea and cough.

At autopsy the upper lobe of the left lung was found to be transformed almost completely into a pultaceous mass, like a mixture of water and sand, which was of a deep chocolate color. A similar lesion, the size of an orange, was encountered in the lower lobe of the same lung. In the upper lobe of the right lung a similar nodule, the size of an orange, was found, and in the lower lobe another, the size of a walnut.

In the abdominal cavity, between the right aspect of the abdominal aorta and the vena cava and just under the liver, was encountered a dense mass, the size of a hen's egg, which was covered by the posterior mural lamina of the peritoneum. The mass was densely adherent anteriorly and to the right to the second portion of the duodenum. To the left and anteriorly it was loosely adherent to the head of the pancreas, posteriorly and to the right to the anterior and left aspect of the vena cava inferior, posteriorly and to the left to the right anterior aspect of the aorta and to the left renal vein. The upper pole of this mass was on a level with the left renal vein; its diameters were 6.5 and 4.5 cm.

Histologically, the testicular tumor and also the pulmonary lesions presented a neoplastic mass of which the epithelial element was composed of solid groups of irregularly arranged, rather sharply delimited, polygonal, round or spindle-shaped, large cells with hematoxylinophilic protoplasm and rather large polymorphic nuclei with abundant pulverulent chromatin. In other words, the tumor was evidently of that type described as a seminoma by F. Chevassu in 1905.

More interesting and significant, however, were the histologic findings in the case of the retroperitoneal tumor. The entire microscopic field was permeated by small cystic cavities lined with a single layer of cylindrical cells. The epithelial lining cells evidenced a basophilic protoplasm and an oval nucleus poor in chromatin. The cysts themselves contained a hematoxylinophilic substance of the type of a secretion. About these cystic structures was a rather rich infiltration of histoid, or lymphocytelike, mononuclear cells which, more distantly, tended to assume a perivascular arrangement. The stroma was composed, of course, of dense strands of connective tissue but there were numerous areas showing a typical cartilaginous tissue.

The author believes that the testicular growth was a primitive tumor of the nature of a seminoma and that the lung lesions were metastases. The retro-

peritoneal mixed tumor, however, was an independent growth, also primitive, and originated from a pluripotential cell (embryonic rest) somewhere in the groove separating the anlage of the urinary system from that of the sex organs.

JOHN W. BRENNAN, M.D.

**Some Observations on the Use of the Combined Thoracicoabdominal Incision.** B. NOLAND CARTER and JAMES A. HELMSWORTH. *Ann. Surg.*, 1950, 131: 687.

Comments on the experience with, and a follow up study of, 43 patients with various lesions of the upper abdomen who were operated upon through a combined thoracicoabdominal incision at the Cincinnati General Hospital are presented. The time consumed in making and closing this incision was more than compensated for by the ease and thoroughness with which the operative procedure could be completed. It is pointed out that in certain instances the abdominal portion of the incision should be made first to determine the operability and extent of the condition present before the thoracic portion is made.

The operation consists of a transverse incision beginning midway between the xiphoid and the umbilicus and extending across the costal margin along the eighth interspace to the posterior axillary line. If a better approach to the upper thoracic cavity is required, the incision is placed in the seventh interspace. In operations on the spleen, liver, and kidney, the diaphragm is incised in the line of the skin incision, but when exposure is required for procedures on the stomach or esophagus the incision in the diaphragm is made from the costal margin directly into the esophageal hiatus. Crushing the phrenic nerve to immobilize the sutured diaphragm is not recommended.

The combined incision was used in 16 operations on the stomach, 5 on the esophagus, 9 on the spleen, 3 on the diaphragm, 3 on the kidney or adrenal gland; in 4 cases in which a shunting procedure was performed for portal hypertension, in 2 penetrating wounds of the thorax and abdomen, and in 1 partial resection of the liver. The wide exposure offered by this incision was of great value in the performance of total gastrectomy for carcinoma of the stomach. Visualization of the entire stomach, the lower portion of the esophagus, the spleen, pancreas, duodenum, and transverse colon was permitted. Removal of diseased lymph glands and anastomosis following resection of a wide margin at the lower esophagus was easier. In 2 cases of achalasia and 2 of carcinoma of the esophagus better exposure was obtained than by a simple transthoracic approach. The combined incision offered easier accessibility for the repair of strangulated diaphragmatic hernias. Blind maneuvers and vigorous manipulation were eliminated with the direct vision offered in the removal of large carcinomas of the kidney. In 8 greatly enlarged and adherent spleens this improved incision was very beneficial. It is recommended as the exposure of choice in splenorenal shunts because of the ease in removing the densely adherent spleen and the excellent visualization of the left kidney which facilitates mobilization of the kidney and isolation of the renal vein.

Immediate postoperative complications were minimal. Evidence of shock and postoperative pain was no greater than with standard incisions. Two of the 43 patients developed a pneumothorax. Benign fluid collections were noted in the pleural cavity in 5 patients. Empyema was a complication in 2 cases. One case of empyema, which ended fatally, was due to a leak at the suture line of an esophagogastrostomy; the other was due to failure to drain the contaminated pleural cavity following resection of a portion of colon in an extensive carcinoma of the stomach. There was 1 case of wound dehiscence and 3 cases of superficial wound infection.

Expected late complications such as ventral hernia, unstable costal margin, diaphragmatic hernia, and constriction of the esophagus were minimal. Suitable follow-up studies were performed in 25 cases. There was 1 case of ventral hernia and 2 patients had a separation of the costal margin with resultant flare and widening of the interspaces. There were no diaphragmatic hernias or cases with faulty emptying of the esophagus. Three cases showed some restriction of movement of the diaphragm.

CURTIS ARTZ, M.D.

# GYNECOLOGY

## UTERUS

**The Dispersion of Cancer of the Cervix.** ERLE HENRIKSEN. *Radiology*, 1950, 54: 812.

The more important of the several routes of dispersal in cancer of the cervix is not easy to establish, as occasional evidence of both direct and lymphatic spread is found in the grossly early clinical case. That the type and degree of dispersion are important in the selection of therapy is apparent, but the presence or absence of early extension is difficult, and frequently impossible, to predicate.

Distant metastases, the unpredictable stumbling blocks to successful treatment (surgical or irradiation), occur more frequently than is usually accepted. Neither the clinical status nor the histologic index unequivocally predicts their presence or absence. The liver was the most frequent site of metastases, with the bones, lungs, and bowel involved in that order. Radiation apparently has little effect on the selection of the metastatic site.

The possible wide dissemination of the disease is further emphasized by the presence of metastases in the skin of the chest, axillary nodes, cervical nodes, pituitary gland, parotid gland, and the left supraclavicular node, a site commonly associated with gastric cancer.

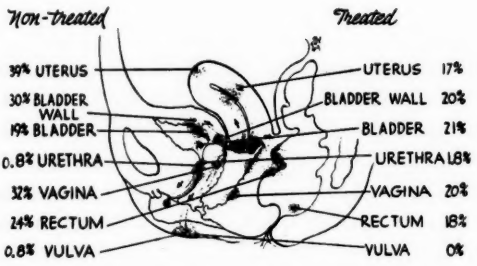


Fig. 1 (Henriksen). Incidence of organ involvement in 154 nontreated and 202 treated cases of cervical carcinoma.

The extension of the disease along the main lymphatic channels, except for the occasional massive nodal masses at the pelvic brim, is not always of serious immediate prognostic importance. The majority of patients die from effects referable to the organs and tissue involved by direct extension, i.e.,

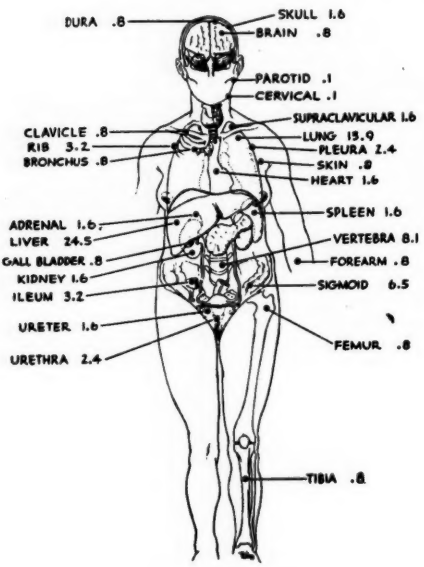


Fig. 2.

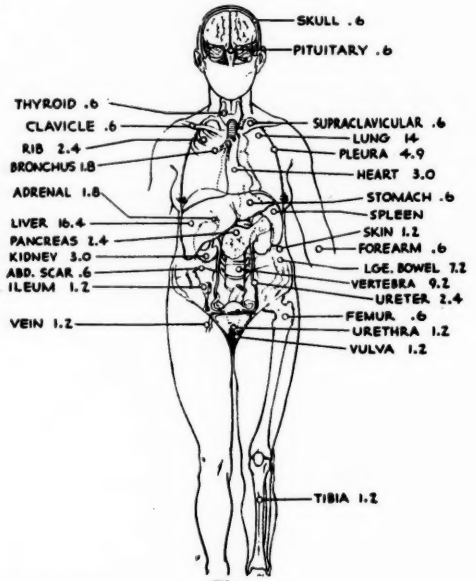


Fig. 3.

Figs. 2 and 3. Incidence of distant metastases in 154 nontreated cases of cervical carcinoma and 202 treated cases of cervical carcinoma. (From: Lymphatic Spread of Carcinoma of the Cervix and of the Body of the Uterus. *Am. J. Obst.*, 1949, 48: 924)

uremia. However, the two means of dispersal are intimately related, and it is unusual to find extensive involvement of the node groups without equally extensive involvement by contiguous spread.

Unfortunately, observations at autopsy offered no opportunity to study the action of radiation. For the most part, in the treated cases the course of radiation therapy had been completed an average of 2.4 years before death. From both clinical and pathological data, it can be stated, first, that the demonstrable effect of radiation is not consistent in the same patient or in the same tissue field; and second, the presence of a normal appearing lymph node in a group of nodes displaying evidence of radiation damage suggests the possibility of lymphoid tissue selectivity to the effects of radiation.

CHARLES BARON, M.D.

**The Surgical Treatment of Cancer of the Cervix.** ERLE HENRIKSEN. *Radiology*, 1950, 54: 819.

Despite the technical advances in radiation therapeusis, approximately 20 per cent of clinical Stage 1 and 30 per cent of clinical Stage 2 cases of cervical carcinoma are not cured by radiation therapy. The basic causes of failure in the early stages of this disease could be (1) a radioresistant type of tumor, (2) a vaguely understood biologic difference of the tissues of the host, and (3) an error in the clinical estimate of the actual extension of the disease.

While radiation therapy is still the method of choice, careful individualization of the case will in some instances permit better results by surgery than by radiation. It is not intended that surgery replace radiation therapy, but improved methods of diagnosis and the advances in surgical technique offer excellent results in selected cases. The two methods of treatment should not be considered as competitors, but as supplementary adjuvants in the co-ordinated effort to improve the salvage rate.

Until a cure for cancer is found, or some new form of treatment is evolved, radiation therapy and surgery, despite their admitted inadequacy, represent our only therapeutic devices. It is all too apparent that a high salvage in the treatment of cervical carcinoma does not reflect solely the technical ability of the radiologist or of the surgeon. Good results mirror the experience and judgment of the physician, his ability to estimate the clinical status of the disease, and to select the best type of treatment.

CHARLES BARON, M.D.

**Carcinoma of the Uterus. The Methods and Results of Treatment at the Alfred Hospital Clinic, 1928–1943.** J. M. BUCHANAN. *Austral. N. Zealand J. Surg.*, 1950, 19: 335.

In determining the stage of carcinoma of the cervix the League of Nations' classification was employed. No histological classification has been attempted beyond differentiation into epidermoid and adenocarcinomatous types. It is stressed that the type of the lesion has no relation to its stage. Thus, a fungating tumor may appear quite frightening because of intense cellular overgrowth and superficial necrosis; yet, due to the absence of parametric spread and fixation, it will be classified as early stage II. On the other hand, some insignificant cervical ulcer may have involved the pelvic cellular tissues to such an extent as to render the ultimate prognosis very serious.

For radiation therapy the radium is screened with 1 mm. of platinum and given up to a maximum of 5,500 mgm. hours; 50 mgm. of radium are applied as an intrauterine tandem with a 10 mgm. tube above and a 20 mgm. tube below, while two 10 mgm. tubes are mounted on a colpostat so as to fit into each lateral fornix. Usually the tubes are left *in situ* for 100 hours. If the patient's temperature rises to over 101° F. for more than 12 hours, the radium is removed regardless of the dosage obtained, and a second course is given after 4 to 5 weeks. Postradium deep x-ray therapy has been abandoned because it is believed that patients adequately treated by radium do not require x-ray therapy, while those whose treatment with radium is inadequate do not benefit by it.

Radical pelvic surgery has been employed on a number of patients in stages I and II. If the operation is to be preceded by primary radiation, not more than 2 months should elapse between these procedures, the ideal time being about 6 weeks, in order to avoid the development of postradiation scarring of the pelvic cellular tissues. In the presence of cervical stenosis with pyometra, primary operation without preliminary radiation is advocated, provided the tumor can be classified as stage II.

In carcinoma of the corpus abdominal panhysterectomy is the operation of choice, with the occasional preoperative intrauterine application of radium to consolidate a friable tumor and thus render surgical manipulation of the uterus less hazardous. In the presence of medical conditions (diabetes, cardiac insufficiency, gross obesity) precluding surgery, radium was administered with intrauterine applicators, usually in two courses of 3,000 mgm. hours each. A case is labeled inoperable only if at laparotomy it is found that the tumor cannot be removed.

Of a total of 217 patients with carcinoma of the cervix, 192 were subjected to treatment, with 61 patients (31.7%) still being alive after 5 years. Among those treated who survived for 5 years there were 8 of 17 in stage I, 36 of 58 in stage II, and 17 of 102 in stage III; none of the 15 treated patients in stage IV lived for more than 2 years. Radical operation was performed on 28 patients, with 3 operative deaths early in this series; 17 patients survived 5 years or more, and 4 died from other causes without any evidence of recurrence. Stump carcinoma was seen in 13 patients (6%) who had been subjected to subtotal hysterectomy from 6 months to 30 years earlier; in this group only 2 patients lived for more than 5 years.

Carcinoma of the body was found in 77 patients whose average age was 60 years. In 9 the condition was too far advanced for other than palliative meas-

ures; 64 patients were operated upon, and 4 were treated by radiation only, with 26 patients (38%) surviving the 5 year period following their treatment.

HERBERT TEICHNER, M.D.

## ADNEXAL AND PERIUTERINE CONDITIONS

**Infection of Ovarian Cysts with Typhoid or Paratyphoid-B Bacilli, with Report of Cases** (Ueber die Infektion von Ovarialzysten durch Typhus- oder Paratyphus-B Bazillen nebst einem kasuistischen Beitrag). H. J. STAEMMLER. *Geburtsh. & Frauenh.*, 1950, 10: 341.

Two cases of dermoid cyst with infection by pure culture of typhoid and of paratyphoid-B bacilli are reported.

The typhoid case was that of a 55 year old woman who had had 3 normal births and 2 miscarriages, had suffered an attack of abdominal typhoid fever, and 3 months later began to suffer from pains in the left hypogastrium. When admitted to the hospital 3 weeks later the patient was very sick. Examination revealed a soft rapid pulse, an accelerated erythrocytic sedimentation rate, and an anemia of 58 per cent.

Vaginal examination disclosed a uterus pushed forward by a mass the size of a man's head in the left side of the lower abdomen. Exploratory puncture produced pus, and colpotomy brought to light pus, mushy fatty substance, and hair.

Laparotomy revealed two ovarian tumors, both dermoid cysts and both densely adherent to the surrounding organs. Both cysts with the affected ovaries and tubes were excised; the uterus was left in place.

Histologic examination of the removed specimens disclosed typically structured dermoid cysts with partial hyaline degeneration of the cyst walls. The larger cyst exhibited—on the right side—rather extensive erosion of the flat epithelial cyst lining and chronic inflammatory infiltration of the subepithelial tissues by strikingly large mononuclear round cells and a few leucocytes. The smaller cyst showed at one point in its wall a large knobby protrusion which proved to be a true fibroma rich in fibrous content. The flat epithelial lining in this cyst was completely destroyed. The wall was lined by an extremely cell-rich granulation tissue with marked exuberance of fibroblastic cells, numerous foreign body giant cells, and dense infiltration with a round cell rich in protoplasm. Here again there were only a few leucocytes. The cultures gave a pure growth of typhoid bacilli and the patient's serum agglutinated typhoid-A, typhoid-H, and paratyphoid-B in dilutions of 1:100. Culture of the urine and stool were overgrown with the Bacillus proteus.

The paratyphoid-B case was that of a 39 year old woman with 3 normal births. Five months before the attack of paratyphoid-B fever (diagnosed at that time by serum agglutination) the patient experienced pains in the left side of the lower abdomen and had a feeling of fullness. Since the attack of enteric fever the size of the abdomen had become visibly greater and the patient began to suffer from severe pains in the small of the back.

Laparotomy presented extensive adhesions in the region of the genital organs. On the left side was an ovarian cyst the size of a child's head. The entire left adnexa were removed. The cyst contained pus and hair and was diagnosed as a dermoid cyst. The bacillus paratyphoid-B was cultivated in pure culture from the cyst contents but could not be recovered from the blood, urine, or stool.

A study of the literature convinced the author that the dermoid cyst of the ovary is attacked by the typhoid-paratyphoid group of bacilli oftener than the other forms of ovarian cyst. He ascribes this fact to some quality of the content of the dermoid cyst which is especially favorable to the development of these organisms. The ability of these bacilli to produce an infection in the cyst while not otherwise manifesting their presence in the body is explained on the basis that the cyst is the structure of the body least affected by the processes of immunity.

These 2 case reports support the theory which maintains that the bacilli of this group are able to produce a purulent reaction in tissue without the assistance of secondary infection by pyogenic bacteria.

The author leaves open the question of the portal of entry and merely mentions the 3 possibilities (hematogenic, lymphogenic, and retrograde routes of infection); however, he believes that the second case suggests the pretyphoidal formation of adhesions and that this would in turn suggest a lymphogenic infection (through the adhesions).

JOHN W. BRENNAN, M.D.

**Acute Intussusception of the Right Tube** (Di un caso di invaginazione acuta dell'ovidotto destro). LUIGI GIORDANO. *Minerva med.*, Tor., 1950, 2: 193.

Contrary to torsion of the uterine tube, which is relatively frequent, intussusception is extraordinarily rare.

A woman aged 32, married, and the mother of 2 children, entered the hospital with complaints of pain in the right lower quadrant of the abdomen and vomiting of a few days duration. She had had no abortions.

The abdomen was distended and its right lower quadrant was rigid and tender to palpation. The temperature was 100.5 degrees F. There was a slight leucocytosis. A diagnosis of acute appendicitis was made. The abdomen was opened through a low midline incision. The parietal peritoneum was reddish and a small amount of serosanguineous liquid was found in the abdominal cavity. The appendix, the uterus, and the left tube had a normal appearance. The omentum was adherent to the right tube, which was enlarged and congested. The right tube was separated from the ovary which appeared to be normal. Close examination revealed intussusception of the ampulla into the infundibulum.

An attempt was made to disengage the intussusception, but rupture of the tube necessitated salpingectomy. The patient recovered.

The author was able to collect from the literature only 5 reports of intussusception of the uterine tube.

Peristaltic movements in the tubes are usually directed from the fimbria toward the uterine junction, but antiperistaltic movements also occur.

The mechanism of intussusception of a tube remains obscure: dynamic factors, variations in the diameter of various segments of the tube, or changes in the wall may come into consideration as responsible factors. JOSEPH K. NARAT, M.D.

## MISCELLANEOUS

**The Vascular Factor in Functional Dysmenorrhea** (El factor vascular en la dismenorrea funcional). JOSE M. SANCHEZ IBAÑEZ. *Rev. espań. obst.*, Valencia, 1950, 9: 104.

The mechanism of functional dysmenorrhea admits of different interpretations, by which it must be understood that not a single entity but a variety of factors is involved in the production of this condition. Some of the causes and mechanisms proposed include intrauterine and extrauterine sources, such as obstructive forces, insufficiency of the myometrium, defects of the mucosa, vascular defects, cervical conditions, an imbalance of the hormones, psychic and nervous factors, allergy, nasomucosal disturbances, and constitutional factors.

The importance of ischemia, however, cannot be gainsaid. The reduction of the flow of blood in the uterine vessels causes an anoxia of the menstrual endometrium, but not to the exclusion of psychosomatic factors which may explain the reactions from sympathectomy, estrogen therapy, and other drugs. STEPHEN A. ZIEMAN, M.D.

**Residual Subperitoneal Pelvic Cysts in a Hysterectomized Patient** (Kystes résiduels pelviens sous-péritonéaux chez une hystérectomisée). J. DE GIRARDIER and R. GAYET. *Mem. Acad. chir.*, Par., 1950, 76: 437.

With the tendency toward conservative gynecologic surgery prevailing, the cystic degeneration of ovaries left *in situ* presents a real problem, since they may be the cause of such severe pain that multiple interventions become necessary.

One case is reported in detail in which a young woman 29 years of age was subjected to no less than 8 operations, radiotherapy, and puncture of the cysts before any real relief was obtained, and who, even then, continued to suffer pain from time to time. These interventions included an appendectomy, removal of the right and left ovaries, subtotal hysterectomy, removal of cysts on two occasions, and an operation for the removal of pressure on the ureter which was causing urinary disturbances.

Classically, the therapeutic indication in these cases is for renewed surgical intervention, but the author believes that radiotherapy yields much better results with fewer risks. Another case is described in which left adnexectomy and appendectomy were done following postabortive infection. Since these measures failed to yield relief a subtotal hysterectomy was done, followed by a colpotomy for an abscess of the pouch of Douglas. A few months later a large mass was discovered in the right vaginal culde-sac. Operation proved extremely difficult. It consisted of liberation of the intestinal loops and of the cecum which was wedged between the bladder and promontory, and dissection of the sigmoid from the right side of the rectum and pelvic wall. The hematic cyst at the base of this funnel was tightly adherent to the ureter so that only the inner wall could be dissected. The colovesical space was reconstructed and the wound closed without drainage. A fever developed, but it subsided following spontaneous evacuation of serosanguineous fluid through the vagina. The patient's mental state was greatly affected, and she was seen 8 years later, again suffering from intermittent pain and fever. Following initial exacerbation as a result of radiotherapy and the development of one new cyst she was finally much better after 6 months. After renewed attacks of pain and the formation of one small cyst she remained well. This case demonstrates the superiority of radiotherapy as compared with reintervention. Three other cases are detailed.

It is necessary to distinguish two types of cystic degeneration, that in conserved ovaries, namely, follicular ovaritis (cystic development of normal ovarian follicles), and the formation of neoplastic cysts. A ciliated cylindrical epithelial lining of the cyst indicates cystic development of wolffian rests. Roentgen therapy does not affect this benign neoplasia. In 1 of the cases described, the cyst communicated with the bladder, requiring excision of the bladder wall to normal tissue and urethral suspension via the cavity of Retzius. Postoperative urinary retention was relieved by the resection of the aponeurotic graft holding the urethra. Since the effects of radiotherapy are slow, taking 2 or 3 months, transvaginal puncture of the cysts may be needed for immediate relief. Attention has been drawn to the fact that in some cases the pains seem to occur in a monthly rhythm associated with slight bleeding. The cystic masses are exceedingly painful on palpation.

Vascular disturbances attributable to the primary operation have been suggested as a possible causative factor, but it would seem that infection, early dystrophies, and reduction of the ovarian parenchyma may be contributing factors. The reduction in ovarian parenchyma is believed to expose the remaining follicles to relatively excessive stimulation by the pituitary gland. EDITH SCHANCHE MOORE

**Studies of Metropathia Haemorrhagica Cystica.** TORE WAHLÉN. *Acta obst. gyn. scand.*, 1950, 29: Supp. 6.

The author reviews the literature on metropathia haemorrhagica cystica and discusses the theories of

its cause. A study was made of all cases observed between 1939 and 1948 at the Women's Clinic of Allmänna Sjukhuset (General Hospital) in Malmö, a town of from 150,000 to 180,000 persons. Good control of patients was maintained because the hospital was the only one in the town.

During the 10 year period, 563 cases were studied and analyzed with reference to symptomatology, course, prognosis, and treatment (especially with chorionic gonadotropin). The results were analyzed in age groups representing patients (1) at the menarche, (2) in the puerperium, (3) in the fertile period, (4) in the climacteric, and (5) after receiving hormone medication.

Approximately half of the patients resumed ovulatory cycles following curettage and, in the author's opinion, some of the remainder were helped by chorionic gonadotropin. The author states that chorionic gonadotropin can be used as substitution therapy with prospects of good results (probable or certain ovulatory cycles).

BYFORD F. HESKETT, M.D.

**Topographic Urethrography.** THOMAS L. BALL. *Am. J. Obst.*, 1950, 59: 1243.

A method called "topographic urethrography" is introduced as a means of studying the geometric relation of the urethra to the symphysis pubis in continent and incontinent women. The technique and results in 27 normal women are reported.

Following parturition there is a tendency for the urethra to be slightly more anterior and inferior to the symphysis than in the nulliparous woman. Continent women with relaxation and prolapse show good paraurethral support, as evidenced by the position of the urethra in the urethrograms. The relaxation of the vaginal wall in these patients is posterior to the bladder neck. In the standing position the urethra has a tendency to occupy a position more anterior and inferior to the symphysis than in the sitting position.

The method has practical applications in the study and management of patients with primary and recurrent stress incontinence. The roentgenograms may suggest variations from the standard techniques that are necessary at operation for a successful outcome. They may help distinguish between true stress incontinence, and the urgency, frequency, dribbling of posterior urethritis. JOHN R. WOLFF, M.D.

**Topographic Urethrography.** THOMAS L. BALL, GORDON DOUGLAS, and LYNN L. FULKERSON. *Am. J. Obst.*, 1950, 59: 1252.

Stress incontinence is associated with displacement of the bladder neck in an arc forward and downward in relation to the symphysis. This results in an accordion effect on the inner third of the urethra and a funneling of the bladder neck. The forward movement is the most significant.

Incontinent multiparas with slight relaxation, and incontinent multiparas with relaxation and prolapse, both show abnormal mobility of the bladder neck particularly in an anterior direction.

The sutures in plication of the bladder neck may be very accurately placed in patients who have been examined by means of topographic urethrography. With the position and measurements known, a sterile tape or ruler may be used to measure from the external meatus or inferior border of the symphysis to the bladder neck. The error would probably be within a few millimeters.

During plication of the bladder neck, the distance to its new position can be measured at the operating table to see if it will rest in a position usually compatible with a competent bladder neck as demonstrated by these cystourethrograms.

Patients with congenital incontinence demonstrate the same defects as those with incontinence resulting from parturition. It is proposed that a more caudad line of origin or an unusually elongated and attenuated levator sling is associated with congenital relaxation and incontinence. JOHN R. WOLFF, M.D.

# OBSTETRICS

## PREGNANCY AND ITS COMPLICATIONS

**The Diagnosis of Low and Posterior Insertion of the Placenta by Cystography** (Diagnostico de la insercion baja y posterior de la placenta por la cistografia). ROBERTO MANLIO GORI. *Bol. Soc. obst. gin. B. Aires*, 1950, 29: 35.

Gori presents 3 cases in which he was able to make the diagnosis of low and posterior insertion of the placenta by using the method of Ude, Weum, and Urner. In 1935 these authors published a study of 35 cases of pregnancy with hemorrhages in the last 3 months, in which they had emptied the bladder by catheter, introduced into it 40 c.c. of a 12.5 per cent solution of sodium iodide, and taken a frontal roentgenogram, utilizing a Potter Bucky equipped table and centering the rays on the middle of the lower abdomen; the exposure was short as for a simple fetal picture. In 14 of the 35 cases they made the diagnosis of placenta previa which was subsequently confirmed clinically or surgically. The only failure was open to discussion because no complete study of the placenta was made after birth in this instance.

The diagnosis of placenta previa is made when the distance between the fetal head and the upper border of the vesical shadow is more than 1.5 cm. In normal cases this space is occupied by the wall of the lower segment, the peritoneum, and the thickness of the vesical wall; in placenta previa the head is displaced and the space is larger because the thickness of the placenta must be added.

Most articles referring to the diagnosis of placenta previa by cystography stress that one of the causes of error is the insertion of the placenta on the posterior uterine aspect. However, Gori's observations show that the low and posterior insertion of the placenta can be recognized if the following details furnished by cystography are taken into consideration. The bladder shadow is much higher than in the normal cases; it is less dense, especially in its central part; and the border of the fetal head is in contact with the shadow or is covered by it. When these 3 roentgen signs are found together, the diagnosis of low and posterior insertion of the placenta may be made with security. RICHARD KEMEL, M.D.

## LABOR AND ITS COMPLICATIONS

**An Analysis of 131 Cases of Transverse Presentation.** BRUCE A. HARRIS, JR., and JOHN W. W. EPPERSON. *Am. J. Obst.*, 1950, 59: 1105.

This study covers 131 cases of transverse presentation occurring at the Johns Hopkins Hospital since 1931. This group is compared with a similar previously reported group which occurred in the hospital up to 1931. The etiology again shows multiparity to be the predominant factor.

There were 4 maternal deaths in this group (3.05 per cent), yet in only 1 case did the transverse presentation play the major role. The last maternal death occurred in 1939. There were 44 fetal deaths, yet of the 83 cases in which the infants were mature and the fetal hearts audible on admission, the mortality was only 14 per cent. The latter mortality was half that of the older reported series. In this series over twice as many patients were treated by cesarean section.

More than half of the fetuses which were delivered vaginally and died had prolapse of an extremity and more than one-third of them had prolapsed cord. These accidents were associated with premature rupture of the membranes and prolonged labor.

The Voorhees bag failed to produce satisfactory cervical dilatation in one-third of the cases in which it was used. In a similar number of cases postpartum infection followed.

Cesarean section should be the procedure of choice in all patients with transverse presentation of mature viable fetuses early in labor. A patient late in labor, with a viable fetus, may still be aided by version and extraction at full dilatation. JOHN R. WOLFF, M.D.

**The Significance of the Anchored Condition of the Uterus to the Wall of the Pelvis during Birth. A Criticism of the Theory of Wolf with Reference to the Mechanics of Cervical Dilatation** (Zur Bedeutung der Uterusverankerung am Becken unter der Geburt. Zur Kritik der Wolfschen Eroeffnungsmechanik). RUDOLF GROSS. *Geburtsh. & Frauenh.*, 1950, 10: 353.

Although Wolf's theory is concerned with both the dynamic and biologic aspects of cervical dilatation in labor, the author here discusses only that part which is concerned with the so-called anchoring of the cervix and isthmus of the uterus to the pelvic walls by means of the fascia and ligaments surrounding and interpenetrating these structures. Specifically, it is with the so-called purse-string effect of these ligaments during the opening of the birth canal in labor that the author is chiefly concerned.

Wolf illustrates his theory with a sketch showing a tobacco pouch, or purse hung up by its string, and thus shows how in the closed, or tightly drawn, condition of the purse-string the pouch is at its greatest distance from the support. When the neck of the pouch is forced open the string is taken up in the fold of the pouch surrounding the neck and the pouch is thus constrained to assume a position nearer to its support because of the shorter supporting string.

In applying this conception to the birth act it is shown how the opening, or dilatation, of the cervix causes it to sink lower into the pelvic canal, and how after the child has been born the cervix must rise higher in the abdominal cavity in order to cause the purse-string effect to bring about cervical retraction.

The author shows that this effect of the isthmocervical fascial apparatus is based neither on logic, nor does it stand the test of clinical experience. The logic of the conceptions is attacked to separate two forces, that is, the longitudinal pull upon the cervix by the muscle fibers of the isthmus above and the radial dilating effect of the impinging fetal head, whereas there is only one force concerned, viz., the muscular contraction of the uterus.

Clinical experience also tends to show that the theory as propounded by Wolf is faulty. Wieloch, in 1925, in his lavage treatment of postpartum conditions showed how the opening and closing of the cervix was not dependent upon the position of the uterus; this he proved by inserting the whole hand into the uterine cavity and palpating the muscular forces at play. Kayser recently tested the excursion of the portio with the cervix dilated and contracted and found his figures at variance with the theory of Wolf. Danforth and Ivy (*Am. J. Obst.*, 1949, 57: 831), by attaching metal clips to the cervix and studying their behavior roentgenologically, found that the cervix did not sink lower in the pelvis as it dilated but actually rose higher into the abdominal cavity, over the inlet.

Of course, the author admits that the fascial complex described by Wolf probably plays an important role in the course of labor but not in the sense attached to it by Wolf's theory. In fact, he believes the theory as such has no value in its application to labor and that it does not add anything of worth to the theory of Sellheim. Nevertheless, Wolf deserves credit for bringing once more into focus the question of the behavior of the isthmocervical apparatus in the course of labor. However, of more value would be a closer study of the biologic processes in this regard, such as the studies of Schickele and Kreis in France, and of De Snoo in the Netherlands.

From the anatomical viewpoint Martin has not been able to verify the presence of the fascioligamentous purse-string as postulated by Wolf, and Stiewe asserts that such a mechanism is not present, is mechanically unthinkable, and physiologically unnecessary.

JOHN W. BRENNAN, M.D

**The Problem of Artificial Serum and the "Retarding Vehicle." Absorption and Elimination of Polyvinyl-pyrrolidone by Pregnant Women and Those in the Early Puerperium** (Il problema dei "sieri artificiali" e dei "veicoli ritardo." Assorbimento ed eliminazio e del polivinilpirrolidone nella gravida e nella puerpera recente). C. PAGANI. *Ann. ostet. gyn.*, 1950, 72: 165.

Human plasma, bovine plasma, human albumin, purified globulin obtained from the hemoglobin of erythrocytes, gum acacia, pectin, and gelatin have been used in the treatment of shock, to re-establish the colloido-osmotic pressure of the blood. As none is perfectly satisfactory, the search for artificial serum continues.

Two new substances are receiving much attention in the modern literature: a polysaccharide called "dextran," manufactured in Sweden, and a German synthetic polymerization derivative of pyrrolidone, namely, polyvinyl-pyrrolidone, called "kollidon." A solution of this product in water-containing sodium, magnesium and potassium chloride, and bicarbonate of soda is called "periston."

Polyvinyl-pyrrolidone (p.v.p.) is a practically nontoxic amorphous substance which has no effect on the bleeding or coagulation time and is eliminated chiefly through the kidneys. The excretion is faster after intravenous injection than after subcutaneous or intramuscular injection.

In obstetrics p.v.p. is used to combat acute anemia in patients with placenta previa, ectopic pregnancy, or postpartum atony. The blood pressure and the frequency of the pulse and respiration promptly return to normal levels after the intravenous administration of p.v.p.

Experiments on pregnant rabbits and observations on pregnant women and those in the early puerperium, undertaken by the author, showed that the product can be detected in the circulation as late as 6 days after infusion. The solution passes the placenta and can be detected in the fetal blood. After intramuscular injection the product can be detected in the circulation as late as the end of the eighth day. No untoward effects on the mother or the fetus could be noticed. The author uses 200 c.c. of a 3.5 per cent solution. The amniotic fluid apparently does not contain p.v.p. after its intravenous infusion.

Hyperviscous solutions of p.v.p. may be used to retard its absorption and to prolong the effect of various drugs, such as antibiotics, hormones, sedatives, antihistamines or diuretics.

JOSEPH K. NARAT, M.D.

**The Question of Peridural Anesthesia** (Zur Frage der Periduralanaesthesie). Karl Burger. *Geburtsh. & Frauenh.*, 1950, 10: 325.

At the Gynecological and Obstetrical Clinic of the University of Wuerzburg, Germany, up to the middle of December, 1949, more than 1,600 patients were operated upon by the peridural method of Dogliotti. About 800 of these were operated upon by the author. The method was confined almost exclusively to laparotomies and vaginal extirpations, as the plastic procedures and the operations for prolapse were carried out under local anesthesia as a rule. The depot technique was seldom used as the results with the aqueous solution became better.

With this method the author had no deaths. There were 2 fatalities before he assumed these duties; however, these could hardly be laid at the door of the method itself. The first accident occurred as a result of mistaken preparation of a 2 per cent solution in place of the desired 0.2 per cent solution. The second fatality showed that the practical rules of technique should be adhered to meticulously, even when the irregularity does not seem to promise any special danger. The anesthesia should always be interrupted definitively when the needle pierces

the dural sac; the administration should not be continued, for example, at the level of another segment of the spine.

Sufficient control of pain was not procured in 4.47 per cent of the cases. Such failure was considered to be present when more than 50 gm. of ether had to be supplemented. The operation had to be discontinued in a few other cases (0.39 per cent) in which serious symptoms of collapse developed. In another few patients the collapse symptoms required some attention, i.e., a few cubic centimeters of ether or evipan. These were chiefly instances of the so-called psychic failure. In the cases of apprehension on the part of the patient any possible discomfort can usually be avoided by novocain infiltration of the ligaments.

The slight tendency of the patient to collapse when this method is used demands careful observation of the blood pressure and timely prophylaxis of abnormal pressure. Other forms of analgesic preparations should be used sparingly.

Cesarean section was used in only 40 cases. In this group, however, 37 operations were done without difficulty. One operation was prudently postponed because the patient did not feel well and in 2 other cases some supplemental ether had to be administered.

The author likes the peridural method better than the continuous caudal anesthesia which seems to be losing some of its popularity, even in America.

On the general principle that the method of anesthesia should not be more dangerous than the operation itself, in all minor cases in which local anesthesia is sufficient, more dangerous methods should be avoided. Thus, in normal childbirth a certain reluctance should be felt toward the generalization of this method. Even though only 1 woman among many should fall a victim to this tendency to produce collapse, the price would be too high, especially when other methods of pain control would suffice, but might not be so perfect.

The author regards peridural anesthesia as a dependable method when properly used. It is simple of application and without many of the deficiencies of other methods, producing no headache, and only a small number of failures.

JOHN W. BRENNAN, M.D.

**Shock in Obstetrics** (Le choc en obstétrique). B. JAMAIN and GIRAUD. *Sem. hôp. Paris*, 1950, 26: 1602.

The author follows the French custom of removing from the group of true shock those cases which they designate as collapse (primary shock of English writers). This is the most frequent form. It appears suddenly. The patient is pale, with cold extremities, prostrated, and indifferent, but fully conscious. There is a mild polypnea, a marked drop in both systolic and diastolic blood pressures, and a rapid weak pulse. The condition may pass over into true shock. As in all forms of shock, prophylaxis is of more importance than the treatment after the condition is established. In collapse the treatment will consist in combating the vasomotor paralysis and in re-establishing the return circulation. All unnecessary moving of the patient and all unnecessary loss of body heat should be avoided. Adrenaline, followed by ergot, will support the vasomotor apparatus. Ephedrine given subcutaneously (1/6 to 1/3 grain) or intravenously (1/6 grain), or pressyl, benzedrine, or the B glucoside of synthetic desoxycorticosterone given intravenously (1/6 to 1/3 grain) may be preferred. Neosynephrine, given subcutaneously or intravenously (1/4 c.c. of the American, or 1/2 c.c. of the French preparation) is especially valuable in that it also increases the cardiac output. Here, as in all forms of shock, a must is the immediate control of all bleeding regardless of the condition of the patient.

In collapse the venous return is supported by intravenous infusions. Physiologic saline solution will be sufficient if the erythrocytes are not seriously diminished and if there is no evidence of abnormal capillary permeability. Glucose solutions, the polycitrate solution of Normet, or the serum hyposulfite and bicarbonate solution of Binet may be chosen in accordance with the conditions present. However, there is only advantage and no inconvenience in using blood, particularly diluted blood. In collapse the amount of blood needed for transfusion will seldom exceed 1,000 c.c.

In true shock the onset is characteristically delayed and progressive. In the beginning stage, short in duration, all that may be determined will be a diminution of the pulse load resulting from an isolated elevation of the diastolic pressure (Crawford). During this period the pulse may be slow. Later the humoral stage occurs. This consists of a diminution of the circulating blood mass, and an increase in the erythrocytic blood count and hematocritic values. There may be a decrease in the quantity of chlorides and of sodium and a relative increase of potassium, an increase in the azotemia and polypeptides in the blood, and a tendency toward acidosis. The diluted state of the blood, which is normal for the end of pregnancy, may hide the presence of a relative polyglobulia, and an apparently diminished hematocrit count does not necessarily indicate the presence of anemia. This form of shock is frequently fatal and demands immediate treatment. The author recognizes three subforms of this condition: so-called essential shock, hemorrhagic shock, and mixed forms of shock.

In the treatment of true shock all the general precautions applicable to collapse apply with even greater force. Vasoconstrictors are not needed in the initial stages but find their indications in the following phases of vasodilatation. Special mention should be made of the B glucoside of synthetic desoxycorticosterone. The natural product (cortine) may be even better. Cardiac tonics are not indicated (functional integrity of the myocardium) and there is no solid basis for the use of analeptics. Of the intravenous preparations, physiologic saline solu-

tion is usually contraindicated because of capillary permeability. The isoviscous solution of polyvinyl pyrrolidone (subtosan) may prove of value; however, the best adjuvant is, again, the blood transfusion.

The blood group problems will be avoided by using blood from a blood bank, and the author recommends the immediate formation of blood banks for all obstetrical services in the hospitals. The collapsed veins of the patients in shock are best approached by choosing the large deep veins rather than the superficial ones for the infusion. Best for this purpose is perhaps the femoral vein. The artery may be penetrated by mistake, but this is not a disadvantage as intra-arterial infusion is just as good and possibly better. In true shock large amounts (more than 2,000 c.c.) of blood are frequently required. Sufficient quantities should be administered to provide against the habitual relapses; it is good practice to continue the transfusion of blood at a slow pace for several hours after evident amelioration in the condition of the patient has set in. The administration of oxygen (7 liters per minute) will assure maximum oxygenation of the blood.

Other methods of treatment, such as tight bandaging (especially of the abdomen), the administration of sugar for possible hypoglycemia, of hypertonic salt solution, of bicarbonated serum for alkalinization in acidosis, and, ultimately, the intracardiac administration of suprarenin, direct intracardiac blood transfusion, and novocainization of the carotid sinus will find occasional application.

JOHN W. BRENNAN, M.D.

## PUERPERIUM AND ITS COMPLICATIONS

**Intractable Hemorrhages after Expulsion of the Placenta** (Hémorragies incoercibles après l'expulsion du placenta). P. BURGER. *Rev. fr. gyn. obst.*, 1950, 45: 63.

Intractable hemorrhages can roughly be divided into two types: those due to atony and those due to changes of variable origin in the circulatory system. In the last 4 years the author observed 5 cases, 2 of the first type and 3 of the second.

The 2 cases of the first type were instances of absolute uterine atony. Atonies of this kind may be the consequence of profound changes in the uterine muscle, such as are observed in some exceptional cases of uteroplacental apoplexy in which the uterine wall is completely disrupted by blood suffusion and transformed into a musculosanguineous magma without any structure and consequently without contracting power. In other even rarer cases there may be degeneration of the uterine muscle. However, the 2 cases did not belong to these categories as the uterine muscle was in perfect condition.

In most cases the uterine atonies are the result of a disturbance of the innervation of the organ, mostly temporary and reparable but constituting a nearly total collapse in these intractable hemorrhages. The shock which often accompanies them early must be the expression of a rather general deficiency of the sympathetic nervous system. Thus, the second patient was in decided shock from the beginning of the hemorrhage when the blood loss was still insignificant and could in no way be considered as an explanation of the shock.

The only treatment for intractable atony of the uterus is hysterectomy and the main difficulty lies in the choice of the correct moment to perform it. Burger solves this problem by observing the behavior of the uterus toward the intravenous injection of hypophysin. If the uterus does not respond vigorously and persistently to the injection and if a second injection given 5 minutes later also remains without effect, it is useless to try any other procedure than hysterectomy. By adhering to this principle it will be possible, in most cases, to intervene before considerable blood loss has occurred, and the operation will thereby lose much of its gravity.

In the 3 cases of the second group the uterine contractions were excellent and there was no uterine lesion, such as rupture. However, the first of these cases was exceptional in that a hyperacute hepatitis or toxic hepatonephritis suddenly occurred at the time of delivery. The sudden, nearly instantaneous exclusion of the hepatic action on the composition of the blood and its coagulability evidently caused the intractable hemorrhage; in addition, the disease itself constituted a fatal accident. In the 2 other cases there was uteroplacental apoplexy, but the role it played was quite different from that in most cases because the uterine contractions were good. The persistence of the hemorrhage could be explained only by a blood dyscrasia, a particular fragility of the blood vessels, or, more probably, by these two factors acting together. There were differences in degree, for in the first of the 2 cases the hemorrhagic tendency was not limited to the uterine body as in the second case, but extended also to the cervix and the vagina. Hysterectomy was performed in the 3 cases. The final result depends on the nature of the disorder which causes the hemorrhage.

RICHARD KEMEL, M.D.

**Basic Changes in the Treatment of Puerperal Sepsis** (Grundlegende Wandlungen in der Klinik des Kindbettfiebers). TH. HEYNEMANN. *Geburtsh. & Frauenh.*, 1950, 10: 245.

Careful bacteriologic study of the cervical secretion should precede the employment of penicillin and sulfonamides.

Inasmuch as antibiotics do not destroy the toxins of pathogenic micro-organisms and of deteriorating tissues, general peritonitis and localized accumulations of pus still require surgical treatment.

Prompt hospitalization of patients with puerperal infections after abortion or after delivery at term is even more imperative than it was before the advent of antibiotics.

The author emphasizes the urgency of prophylactic treatment with the new drugs.

Bimanual gynecologic examination is essential for he diagnosis of an infected focus in the pelvic veins.

The occurrence of micro-organisms resistant to penicillin and sulfonamides, the not infrequent intolerance of the latter, and the absence of an antitoxic effect make a further search for other antibiotics highly desirable. JOSEPH K. NARAT, M.D.

## MISCELLANEOUS

**The Question of the Prevention and Treatment of Hemolytic Disease of the Newborn during Pregnancy and Birth** (Zur Frage der Verhuetung und Behandlung des Morbus haemolyticus neonatorum waehrend Schwangerschaft und Geburt). P. ELSNER. *Wien. med. Wschr.*, 1950, 100: 310.

The author reports the case of a Rh-negative pregnant multipara, aged 30, who had Rh-immune bodies in her blood. Her first child was living and well; since then she had 4 stillbirths or premature births which resulted in the death of the child. As the woman was very anxious to have another living child but her history and the determination of her Rh-immune body titer suggested that, by waiting until the end of pregnancy, only a child severely damaged by erythroblastosis could be expected, it was decided to use the method recommended by Wiener, namely, early cesarean section with immediate exchange transfusion by way of the open umbilical vein.

Apparently, the pregnancy was in the thirty-eighth week, and further delay was inadvisable. A very soft and pale girl, 45 cm. long and weighing 1,800 gm., was delivered, and immediately after the operation a catheter 2.5 mm. thick was introduced into the umbilical vein presumably down to its entry into the inferior vena cava. Braun's transfusion apparatus was used to alternately inject 10 c.c. of freshly obtained Rh-negative group O blood and then remove 10 c.c. of the child's blood. The condition of the child improved temporarily during the transfusion, but after the administration of 100 c.c. of donor blood and the removal of 90 c.c. of the child's blood the transfusion was suspended because of the moribund condition of the patient; death supervened an hour later. Autopsy revealed the typical changes of hemolytic disease of the newborn. Thus, the intrauterine damage to the fetus had already reached the point at which help came too late.

Observations during the past 2 years have shown that nothing can yet be stated about the time of onset of the fetal erythroblastosis because too many different factors are involved. A criterion for the beginning antigen-antibody reaction as a causal agent of the fetal damage is offered by the time of onset and the amount of Rh-immune bodies, especially the univalent kind. High values and a sudden fall must be regarded as a dangerous sign. It would seem that the sudden fall in Rh-immune bodies is due to the fact that the vitality and, therefore, the defense powers of the fetus are so reduced that the maternal Rh-immune bodies are absorbed by the fetus. Removal of these substances from the child's circulation is thus absolutely necessary.

The indications for early cesarean section in Rh incompatibility between mother and child seem to be present under the following conditions.

1. The critical time lies between the thirty-sixth and thirty-eighth weeks of pregnancy.
2. Rh-immune bodies must be demonstrable in the maternal blood as proof of sensitization.
3. The titer of these substances should not be too high, and no time is to be lost in performing the operation when there is a sudden fall in the immune bodies. RICHARD KEMEL, M.D.

**Corticosteroid Excretion During Pregnancy, Especially in Toxemia of Late Pregnancy.** S. PARVIAINEN, K. SOIVA, and S. VARTIAINEN. *Acta obst. gyn. scand.*, 1950, Supp. 5.

The authors attempt to correlate toxemia of pregnancy with one of Selye's hyperfunctional diseases of adaptation, and the results seem to strengthen their belief. They have studied the corticosteroid production during pregnancy according to the method (based on urinalysis) of Heard and Sobel.

The RS (neutral lipid-soluble reducing substance) was studied. The RS excretion of normal nonpregnant women is 2:00 mgm. per 24 hours, or 0.80 mgm. during the night, and 1.20 mgm. during the day. In pregnant women, the RS is about twice as great as in nonpregnant women. It is highest in the ninth month of pregnancy. The RS is rather high (0.34 mgm.) per 100 c.c. of urine in the third month of pregnancy, but decreases soon afterward to 0.20 to 0.23 mgm. per 100 c.c. of urine. It begins to rise again in the eighth month (up to 0.38 mgm. per 100 c.c.) and reaches a peak (0.48 mgm.) in the ninth month. As the RS excretion rises, the excretion of urine decreases.

RS excretion varies widely in toxic cases (from 1.23 mgm. to 8.15 mgm. in 24 hours) although patients are at complete rest. It has no distinct correlation with the clinical picture.

Delivery was complicated by toxemia more frequently in women whose RS excretion was high during pregnancy.

The authors believe that their hormone analyses as well as their other investigations indicate that toxemia of late pregnancy may be interpreted as one of Selye's hyperfunctional diseases of adaptation.

BYFORD F. HESKETT, M.D.

# GENITOURINARY SURGERY

## ADRENAL, KIDNEY, AND URETER

**Pheochromocytoma: Its Diagnosis and Treatment.** ELMER C. BARTELS and RICHARD B. CATTELL. *Ann. Surg.*, 1950, 131: 903.

A pheochromocytoma, an epinephrine-producing tumor, is suspected in association with any type of vasomotor attacks or with nonthyroid hypermetabolism, or both, and may be diagnosed by certain clinical studies. It may be removed with the aid of the adrenolytic drugs (dibenzamine or benzodioxan) which prevent fatal hypertensive reactions during the operation. Four such cases are presented.

In addition, an important aspect exists in relation to any general surgical procedure during which the condition may initially produce a severe hypertensive reaction leading to acute heart failure and death. Four such cases occurred over a 3 year period, in the instances of a lumbar sympathectomy, an operation for inguinal hernia, a thoracic operation, and a gastrectomy. A pheochromocytoma was found at autopsy in each patient and was considered to be the cause of death. With the onset of a hypertensive reaction during surgery, and with it the suspicion of a pheochromocytoma, one of the following courses must be instituted:

1. Immediate abandonment of the operation and, after recovery, further investigation.

2. Exploration of the adrenal glands and sympathetic chains if the operation is intra-abdominal, and removal of the tumor if found.

3. Administration of an adrenolytic drug to control the hypertension, and continuation of the initial operation. Investigation should be made later.

The four main cases are reviewed, the fourth one being originally presented. This was the case of a 20 year old girl whose symptoms began 8 months previously with morning occipital headaches. A month later her blood pressure was found to be 200/130, the basal metabolic rate +40, the pulse 120, and the thyroid gland nonpalpable. The glucose tolerance curve was typically diabetic. An intravenous pyelogram showed very slight downward displacement of the left kidney. During the intravenous administration of dibenzamine (182 mgm.) the pressure fell to a normal level of 130/90. At operation, the left adrenal area revealed the tumor, but before it was removed, the presence of a normal right adrenal gland was ascertained by opening of the peritoneal cavity. The tumor measured 6 cm. in diameter. During the operation, a total of 175 mgm. of dibenzamine was given intravenously to maintain a subhypertensive level. The postoperative course was satisfactory. The blood pressure became normal and all symptoms were relieved.

An analysis of the 4 cases of this spell-inciting or hypermetabolism-producing tumor showed clinical durations varying from 4 months to 20 years. In 3 cases, the vasomotor attacks or spells were outstanding. Palpitation was noted by all of the patients. Excessive perspiration was periodic in 2 and constant in 2 patients. Two suffered from poststernal pain with dyspnea, characteristic of angina pectoris, during an attack. Blotchiness of the skin was observed by 1 patient. Occipital headache was noted by 2 patients. One patient developed blindness during the early part of pregnancy, associated with vascular retinopathy. Three patients were considered to be hyperthyroid because of the hypermetabolism; 2 of these had had subtotal thyroidectomy without benefit and this had been advised for the third. The hypertension was continuous in 1 patient. Two patients presented typical hypertensive attacks, and 1 patient had a slightly fluctuant hypertension. The basal metabolism rate studied in 3 patients showed a normal rate when the blood pressure was normal, but it was +35 during a hypertensive attack in 1 patient. In another case it ranged around +60 during periods of near-normal blood pressure and even under pentothal anesthesia. In the third case with continuous hypertension, the rate ranged around +35.

Intravenous pyelograms were sufficiently abnormal in 2 cases to indicate the probable tumor site. Abnormal sugar metabolism was noted in 3 patients. In 1 patient the blood sugar rose from 100 to 160 mgm. during a hypertensive attack. The other 2 patients had suggestive diabetic glucose tolerance curves. Glycosuria was not noted.

Four specific diagnostic tests designed to affect the blood pressure were studied. The intravenous administration of histamine, 0.05 mgm., produced a hypertensive rise in only 1 of 3 cases. Subcutaneous mecholyl, 15 mgm., produced a hypertensive response in 2 of the 3 cases. Of 2 patients given 3 c.c. of etamon intravenously, 1 patient did not respond. Because of sustained hypertension in 1 case, dibenzamine was given intravenously in a 0.6 per cent solution. A drop in the pressure occurred after 15 minutes, from 190/120 to 140/120. At the end of 1 hour, it was 120/80, after a total of 182 mgm. of dibenzamine had been given. Benzodioxan, another adrenolytic agent, has been reported to be equally informative, but its use may cause an alarming hypertensive reaction in patients who do *not* have a pheochromocytoma.

To avoid a hypertensive attack precipitated by the process of removal of this tumor, spinal anesthesia is avoided because it has a direct effect on the blood pressure. Ethylene ether or cyclopropane ether is given through an endotracheal tube. Only small quantities of intravenous fluid should be given, and only enough blood to replace that which has been lost. An adrenolytic drug is needed to combat the hypertensive reaction. Lowered pressure and its attendant cerebral anoxia after removal

of the tumor may be guarded against simply by lowering the head into the Trendelenburg position. The amount of adrenolytic drug found to be necessary to lower the blood pressure or prevent the hypertensive reaction during diagnostic studies can be given intravenously before actual dissection of the tumor.

The usual kidney incision is made, with removal of the twelfth rib for better exposure in the presence of a large tumor. The pleura is avoided. The kidney is displaced downward and medially without actual exposure of the kidney, and the fascia is then incised to explore the adrenal gland. For large tumors, particularly on the left side or when general exploration is indicated, the abdominal approach may be used. Both adrenal glands are explored, since in 10 per cent of the cases the tumors may be multiple and occasionally there may be congenital absence or atrophy of the other gland. Compression of the tumor should be avoided in its delivery. The pedicle vessels are dissected and clamped as early as possible to avoid the release of excessive epinephrine. Partial or total adrenalectomy is carried out, according to the tumor findings.

The hypotensive state and collapse with death following removal of a pheochromocytoma has been wrongly considered to be due to epinephrine deficiency, and has actually been treated with the intravenous administration of epinephrine. However, epinephrine lack is not the cause, since the collapsed state may occur with the tumor still *in situ*. This event is explainable as acute failure of the left side of the heart, resulting from excessive circulating epinephrine. This can be prevented only by avoiding prolonged hypertension during the operation by the administration of benzodioxan or dibenzamine during the operation. The amounts of dibenzamine used in 2 cases ranged from 60 mgm. to 175 mgm.

All 4 patients recovered from the surgical removal of their pheochromocytoma. The blood pressures returned to normal and no further attacks occurred. The basal metabolic rates and glucose tolerance curves returned to normal. The histamine and mecholyl tests became negative in all of these patients.

DAVID MOVITZ, M.D.

**Instrumental Visualization of the Renal Pelvis at Operation as an Aid to Diagnosis. Presentation of a New Instrument.** W. F. LEADBETTER. *J. Urol.*, Balt., 1950, 63: 1006.

The author described a technique and an instrument which allow easy visualization of the renal pelvis, infundibula, and many calyces after introduction of the latter through a small pyelotomy incision at operation.

In 1 instance, after direct study of the pelvis, infundibula, and calyces, a nephrotomy incision was made and an abnormal papilla which had been noted at pyeloscopy was excised. This showed a chronic inflammatory process with scarring on microscopic examination.

Five months after operation, the patient was well, whereas almost constant hematuria had been present for 2 years prior to the operation.

ROBERT TURELL, M.D.

**Renal Aplasia: Two Case Reports.** H. O. MERTZ and WILLIAM NILES WISHARD, JR. *J. Urol.*, Balt., 1950, 63: 959.

The aplastic kidney may be only a small mass of undifferentiated scar tissue. Its identification is difficult and often is possible only upon histologic examination. This small renal remnant is doubtless frequently overlooked. Less frequently the aplastic kidney is large, cystic, and easily palpable. When such a tumor mass exists in the loin its probable relation to the urinary organs is readily recognized; however, its true nature more often will be disclosed only at operation. The records of 2 children who had the latter type of renal aplasia are described.

These 2 cases are believed to present failure of normal development of the ureter, with secondary cystic changes of the metanephric tissue. In one, the lower end of the ureter was present; in the other, at operation, it was absent. No ureter was found attached to the cystic mass in either patient. In neither case was there any reason to suppose that any of the tissue had ever functioned as a kidney. In both patients the mass was located in the renal fossa. In 1 case it was composed of several large cysts with a few small cysts; in the other, it had the appearance of a cluster of grapes. In neither was there any evidence of pelvis, calyx, or collecting tubules.

ROBERT TURELL, M.D.

**Giant Hydronephrosis of Traumatic Origin: A Case Report.** E. W. CAMPBELL, W. C. HUNSICKER, and J. MARCONIS. *J. Urol.*, Balt., 1950, 63: 970.

Massive hydronephrosis, whether of congenital or traumatic origin, is a clinical entity in which errors of diagnosis are due to the silent development of this pathologic state. A large size is attained with a paucity of symptoms because of the absence of infection. Usually the presence of infection leads to inflammatory changes in the renal parenchyma and pelvis, which prevent expansion of the sac; furthermore, pain and toxic symptoms appear which induce the patient to seek medical attention earlier.

Most authors believe that hydronephrotic kidneys which eventually reach giant proportions are caused by some form of congenital obstruction at the ureteropelvic junction. Trauma as an etiologic factor has been attested by Meltzer who, in a review of the literature, discovered 18 authenticated cases which occurred months or years after an antecedent history of trauma. The traumatic principle is upheld by Eisendrath who contends that ureteral stricture can develop from trauma to be followed by a late sequela of hydronephrotic change in the injured kidney.

The classic description, and the types of injuries which eventuate in the production of traumatic hydronephrosis are as follows:

Injury to the ureter may coexist with injury to the kidney. Usually the trauma to the ureter is in the upper portion just below the pelvis. The ureteral wall may be crushed or torn, and partial or total stricture develops at the site of the injury. Perirenal or periureteral extravasation of blood, through compression, may bring about obliteration of the ureteral lumen. With parenchymal injury and rupture of the renal capsule, a large hematoma forms. Only part of this is absorbed, and the residual clot becomes organized by newly formed connective tissue. This eventually shrinks and causes distortion or constriction of the ureter.

The authors' case of giant traumatic hydronephrosis presented several interesting and unique features. The diagnosis was originally confused by a previous occurrence of an osteogenic sarcoma. It was thought that abdominal metastasis not only caused ascites, but also produced ureteral obstruction on the left side, eventuating in hydronephrosis.

In the case presented, a total of 9 paracenteses were performed before the origin of the fluid was found to be a hydronephrotic sac.

The most interesting feature was the ability of the apparently small number of renal parenchymal units to secrete large quantities of fluid. This is strikingly significant of the potential function of renal cortical tissue of hydronephrotic atrophy.

ROBERT TURELL, M.D.

**Parathyroid Adenoma and Renal Calculi.** HERMAN L. KRETSCHMER. *J. Urol.*, Balt., 1950, 63: 947.

Every urologist who is interested in the relationship of parathyroid disease to renal calculi should read "*A Page Out of the History of Hyperparathyroidism*" by Fuller Albright. Here he will find an excellent review of the development of our knowledge of the parathyroid glands. Also presented in great detail is the important role played by Erdheim in the development of our knowledge of the relationship between the parathyroid glands and calcium metabolism. It is gratifying that Albright has emphasized the value of Erdheim's contributions to our knowledge of this subject, since it has not received the recognition it deserves.

Erdheim made the first observations on disturbances of the physiology of the parathyroids. His observations were made in 1906, long before the birth of modern endocrinology.

The relationship between lesions of the parathyroids and renal calculi was first called to our attention by Fuller Albright and his co-workers in Boston.

Because of the increasing interest in the subject of the relationship between lesions of the parathyroid glands and renal calculi, 4 cases are presented. The author emphasizes the fact that in cases showing a history of recurrent stones, or a history of many operations for stones, the possibility of the cause for these recurrences should be sought for in the parathyroid glands.

All 4 patients whose cases form the basis of this article had a history of one or more operations for renal or ureteral calculi. In only 1 case were skeletal changes present. Bone changes do not occur in all cases of hyperparathyroidism and more and more attention has been called to the role of the parathyroids in renal stones.

The onset of hyperparathyroidism is insidious and its course is progressive. The symptoms of hyperparathyroidism vary greatly. The principal evidences of the disease are lassitude, muscular hypotonia, and weakness, especially in the legs, with decreased electrical excitability. Gastrointestinal symptoms such as constipation, indigestion, and anorexia may be present.

The renal symptoms are the same as in any case of renal stone. There may be pain, nausea, and vomiting, and blood in the urine. Recurrences are common. In many cases there is a history of one or more attacks of renal colic associated with the passage of calculi. The urinary calcium excretion is increased.

It is imperative that in every case in which there is a history of recurrent or multiple calculi, careful examination should be made for the presence of a parathyroid adenoma or hyperplasia. The most significant laboratory findings are hypercalcemia, hypophosphatemia, hypercalcinuria, and hyperphosphaturia. The normal value generally accepted for serum calcium is 10.0 mgm. per 100 c.c., plus or minus 1.0 mgm. The normal value for the inorganic phosphorus is 3.5 mgm. per 100 c.c., plus or minus 0.5 mgm.

Cook and Keating stated that in cases in which uncertainty exists as to the diagnosis, they frequently rely on the quantitative determination of the excretion of calcium in the urine while the patient is on a diet low in calcium, as suggested by Bauer and Aub. They place the patient on a weighed diet of 2,000 calories and 125 mgm. of calcium each day. In a normal person, the daily excretion of calcium in the urine is less than 100 mgm. A patient with hyperparathyroidism generally will excrete more than 200 mgm. per day. If the excretion is between 150 and 200 mgm. per day, one should suspect the presence of hyperparathyroidism.

The decision whether to remove the adenoma first or to operate upon the kidney stone may present a difficult problem. In the ordinary case, treatment should probably be directed toward the parathyroid adenoma. There may be exceptions to this procedure in cases in which the patient has only one kidney with a superimposed infection, or in cases in which anuria is present due to complete obstruction by a stone impacted in the ureter.

ROBERT TURELL, M.D.

**Pararenal Teratoma: Case Report.** WILLIAM J. BAKER and ALEX B. RAGINS. *J. Urol.*, Balt., 1950, 63: 982.

The number of pararenal teratomas would be augmented if the so-called dermoid cyst, which in reality is a teratoma, were included. That the dermoid is a teratoma, or a form of teratoma, is supported by the comments of Novak who states that

it is evident no sharp dividing line can be drawn between the dermoid and teratoma since, in the former, which is characterized by a predominance of ectodermal elements, mesodermal and occasionally tissue from the endodermal layers are also found. Furthermore, the histogenesis of the two is identical.

A number of theories pertaining to the pathogenesis are presented. These tumors may be benign. A small percentage of them may undergo malignancy. It is emphasized by Willis that teratomas are tumors arising from foci of plastic pleuropotential embryonic tissue which escaped from the influence of the primary organizers during early embryonic development. This escape is in some way related to disturbances which emanate from the invaginated organizing tissues of the primitive streak and affect median or paramedian parts in close relationship to these tissues. As a result the affected primordium, as it grows, differentiates and matures as fast as it grows, and a benign cystic teratoma results. If the tissues fail to mature completely but retain their capacity for continued growth at the embryonic level, a malignant, embryonic teratoma results.

The authors presented in detail the clinical and pathologic picture of a case of pararenal teratoma.

ROBERT TURELL, M.D.

## BLADDER, URETHRA, AND PENIS

**The Bladder in Fracture of the Bony Pelvis; The Significance of a Teardrop Bladder as shown by Cystogram.** GEORGE C. PRATHER and THOMAS F. KAISER. *J. Urol.*, Balt., 1950, 63: 1019.

Although the empty bladder can be torn by bony edges or by strains on its ligamentous moorings, the protection afforded it by surrounding structures makes it much less susceptible to rupture than the distended bladder. Rupture of the bladder is not associated with isolated fractures of the sacrum, coccyx, ala of the ilium, ischium, or acetabulum. Lateral crushing injuries and compression of the pelvis in an anteroposterior direction are the types of injuries which result in disruption of the continuity of the pelvic girdle and which are likely to result in extravasation of urine. The extravasation of urine may be either intraperitoneal or extraperitoneal. Intraperitoneal extravasation is usually associated with a rent in the posterosuperior aspect of the bladder. Extraperitoneal extravasation usually occurs in the space of Retzius from whence it may invade the subcutaneous spaces from the knees to the umbilicus. It may also infiltrate the retroperitoneal tissues of the pelvis and abdomen. Infected urine knows no fascial bounds.

Physical signs may be misleading in rupture of the bladder. Retroperitoneal hemorrhage, intraperitoneal bleeding, and urinary extravasation may give identical physical signs. Distressing urinary symptoms occur in a large percentage of cases of fractured pelvis even without rupture of the bladder or urethra. The urinary findings may be misleading; grossly clear urine may be passed in spite of rupture of the bladder. Gross hematuria occurs not infrequently without rupture of the bladder.

The diagnosis of a ruptured bladder is best made by a retrograde cystogram or cystourethrogram. Pneuomoroentgenography is dangerous. The use of a catheter often gives misleading information. The authors routinely perform intravenous pyelography at the time that the cystogram is taken. On the cystogram, the vertically elongated, narrow, teardrop-shaped bladder is most frequently seen. With a posterosuperior rupture, the configuration may resemble a diverticulum. In extensive rupture of the bladder, marked diffusion of the contrast material into perivesical tissue may result in a "sunburst" pattern.

The most important feature in treatment is early diagnosis. Once diagnosed, a suprapubic cystotomy should be performed as soon as the patient's condition permits. If the rupture is intraperitoneal, free fluid is removed from the peritoneal cavity and the bladder rent is closed. The peritoneal cavity is closed without drainage. Cystotomy and extravesical drainage suffice in case of extraperitoneal rupture.

The authors report 2 cases. Both showed a teardrop configuration of the bladder on the cystogram and in neither was there evidence of rupture on the retrograde cystogram. In 1 case, intravenous urograms demonstrated urinary extravasation. The patient was operated upon and recovered. The other patient with a teardrop type of cystogram and no definite rupture was treated by constant urethral drainage only and recovered.

A teardrop configuration of the bladder may result from perivesical extravasation of the blood or urine, perivesical abscesses, or any extensive pelvic hemorrhage above the levator ani muscles. Despite the rather marked abnormality in the roentgenographic appearance of the bladder, it usually returns to the normal shape rapidly with proper care.

JOHN T. GRAYHACK, M.D.

**Vesical Calculus, with Report of a Gigantic Stone in the Female Bladder.** WILLIAM NILES WISHARD, JR., and MYRON H. NOURSE. *J. Urol.*, Balt., 1950, 63: 794.

The authors present a discussion on vesical calculus in 242 patients, the majority of whom were males. They state that the most probable time for a stone to develop is in the seventh decade of life. Chemical analysis and culture were not done on a sufficient number of stones to make the figures of value, but the phosphatic and oxalate salts accounted for the majority of the stones, and an alkaline urine was concomitant in most instances. Single stones predominated over the multiple type. The authors state that it is well to note the number of errors which would accumulate if roentgenography were the only diagnostic method.

The most frequent associated disease was hyperplasia of the prostate; median bars, strictures, carcinoma of the prostate, and prostatic calculi were also encountered. Carcinoma of the bladder occurred

in only 3 cases. Factors which might have exerted a predisposing influence in the causation of stone were vesical diverticula, neurogenic bladders, unhealed fistulas from previous operations, and other conditions.

In the majority of cases, litholapaxy or resection of the prostate (or both) was performed, although it is noted that recently, as resection became more common, the closed method was used more often.

Generally, good results were obtained. Ten per cent of stones recurred and 11 patients died, including 3 who were not operated upon. The causes of death included pulmonary embolism, tuberculosis, leucemia, pyelonephritis, pneumonia, and postoperative heart failure. Thus, the death rate of patients operated upon was 3.4 per cent. The hospital stay varied from 1 week to 1 or 2 months.

The case of a giant calculus in a female bladder is reported. The patient was seen in 1926 with a urethral stenosis and at sporadic intervals thereafter, occasional blood, pus, and albumin were found. In 1943 mild alkaline encrustation was noted. In 1947 a 3 by 3½ cm. calculus was noted. At the patient's wish, surgery was delayed. In February, 1948 a calculus 9½ by 7 by 6½ cm., weighing 284 gm., was removed suprapubically. A Simpson obstetrical forceps was used for delivery. Post-recovery alkaline infection of the bladder was noted and Suby's solution was used for irrigation. The authors have reported this case because the stone was of large size for any bladder, and especially so for a woman.

NATHAN ROSENBLOOM, M.D.

**Diverticulum of the Anterior Urethra** (Diverticulo de la uretra anterior). A. ROCCHI, A. ALVAREZ VICENTE, and J. S. LLORENS. *Rev. argent. urol.*, 1949, 17: 151.

A man 68 years of age was admitted with complaints of dysuria, increased frequency of diurnal and nocturnal micturition, and occasional involuntary loss of urine at the end, after emptying his bladder. Suprapubic prostatectomy was performed. Ten months later the patient was readmitted because of terminal incontinence.

A tumefaction was discovered in the midline of the penoscrotal angle. When squeezed, it yielded purulent urine which escaped from the urethra.

Urethrography demonstrated a diverticulum and the diagnosis was confirmed by endoscopy.

The diverticulum was removed through a longitudinal incision. The aperture in the urethra was closed in transverse direction with zytor, the fascia with plain No. 0 catgut, and the skin with zytor. A drain was inserted. The patient made an uneventful recovery.

The retention catheter, which had remained in the urethra 2 months after the prostatectomy, evidently had produced an infection of the congenital diverticulum.

A follow-up urethrographic study failed to reveal signs of stenosis of the urethra.

JOSEPH K. NARAT, M.D.

## GENITAL ORGANS

**Some Observations on the Anatomy of the Bladder Neck and Posterior Urethra with Reference to Prostatic Obstruction.** S. SCHER. *Brit. J. Urol.*, 1950, 22: 116.

After the dissection of 22 bladder necks and the adjoining structures, several muscle bundles were identified which seemed to have important roles in the physiology of micturition. However, this study failed to reveal anything suggestive of a sphincter at the vesical neck.

Observations were made through the cystoscope during attempted urination, and movements were compared in patients without obstructions, in those with fibrotic bladder neck obstruction, and in those with adenomatous enlargement of the prostate gland.

During normal micturition the entire bladder neck opened out. When there was fibrotic obstruction confined to the bladder neck, movement on the anterior aspect was diminished and was often in the reverse direction from normal. With prostatic hyperplasia the lateral lobes were pulled apart in early cases but as the enlargement progressed the lateral lobes were drawn together when the patient strained and sometimes the lumen was completely obliterated.

These observations have been interpreted as suggesting that there is some mechanism other than the trigonal muscle which opens the bladder neck.

ORMOND S. CULP, M.D.

# SURGERY OF THE BONES, JOINTS, MUSCLES, TENDONS

## CONDITIONS OF THE BONES, JOINTS, MUSCLES, TENDONS, ETC.

**Horizontal Body Section Roentgenography.** J. J. STEVENSON. *Brit. J. Radiol.*, 1950, 23: 319.

The author gives a description of the use and application of horizontal planigraphy with case presentations. The apparatus used and described employs the principle of rotation of the patient and film through 360 degrees simultaneously while exposure is made with a stationary tube. The best results were obtained when the angle subtended by the primary beam and the horizontal was between 25 and 35 degrees. The apparatus is highly technical and very intricate. The principles are the same as vertical planigraphy. In horizontal planigraphy, the patient sits on a motor-driven turntable coupled to a rotating platform on which the cassette rests in a horizontal position. The x-ray tube, with a focal film distance of 3 meters, points obliquely downward at the film. An exposure time of 3 seconds is used, during which time the patient and cassette are turned through 360 degrees.

In lesions of the head and neck and intrathoracic structures, this method is shown to be of definite aid. In the cases here presented it was shown to be of specific aid in studies of the mediastinal structures, the great vessels, the trachea, esophagus, cardiac diameter, pulmonary cavitation, bronchogenic carcinoma, and also in studies of the laminae and transverse processes of the vertebrae.

T. E. HAVEL, M.D.

**Clinical and Biochemical Aspects of the Calcification of Tissues and Heterotopic Ossifications** (Contribution a l'étude clinique et biochimique des calcifications tissulaires et des ossifications hétérotopiques). R. FONTAINE, P. MANDEL, J. WITZ, and OSTERTAG. *Rev. orthop.*, Par., 1950, 36: 3.

Calcification represents a tissue reaction to the destruction of necrotic cells, while heterotopic ossification represents an active reconstruction phenomenon. Roentgenographically, the ossification shadow is much denser, the ossification possessing the quality of bone and having the same mineral content as normal bone, and differing from calcifications which have a more hazy appearance.

The calcification forms a reservoir from which the organism can utilize material for forming living tissue like heterotopic ossifications. The authors studied the chemistry of 19 cases, of which 15 were calcifications and 4 ossifications (calcium, phosphorus, nitrogen, and the ratio between them.) The values of calcium were between 0.185 and 0.302, and those of phosphorus between 0.97 and 0.140, similar to the content of normal bone. The nitrogen content, however, was lower on the average. The bone consists of two materials:

1. A mobile mineral content—calcium, phosphorus and
2. A fixed content—nitrogen protein.

The calcifications deposit calcium and phosphorus like normal bone but they are poorer in nitrogen protein, while the heterotopic ossifications show normal proportions of these three elements.

ERNEST H. BETTMANN, M.D.

**Multiple Myeloma. An Analysis of 21 Proved Cases.** STEPHEN WHITE and ARTHUR J. TILLINGHAST. *Am. J. Roentg.*, 1950, 63: 851.

An analysis of 21 proved cases of multiple myeloma at the New York Hospital from 1932 to 1947 is presented. The microscopic proof was obtained from biopsy, sternal marrow puncture, or autopsy material. Solitary forms have been described.

The clinical picture is not characteristic at the onset. Pain, especially in the lower back, was reported in 86 per cent of one series reported. In this series 18 of the 21 patients had backache. Pathological fractures occur in many cases. Palpable tumors may be present. Other clinical features are cachexia, anemia, albuminuria, presence of the Bence-Jones protein (8 to 65 per cent), increase of the total protein of the blood, reversal of the albumin-globulin ratio, elevation of the blood calcium, nephrosis with elevated nonprotein nitrogen, chronic bronchitis and emphysema, and neurologic symptoms related to the extent and location of the destructive lesions. Roentgen characteristics vary, the most typical form being the widespread punched-out osteolytic lesions in the skull, ribs, and pelvis. In the authors' series, 2 cases showed only diffuse osteoporosis resembling hyperparathyroidism or senile osteoporosis. Others resembled osteolytic lesions of metastatic carcinoma.

DANIEL H. LEVINTHAL, M.D.

**Scapulocostal Syndrome (Fatigue-Postural Paradox).** ARTHUR A. MICHELE, JOHN J. DAVIES, FREDERICK J. KRUEGER, and JOSEPH M. LICHTOR. *N. York State J. M.*, 1950, 50: 1353.

The authors call attention to the fact that clinicians should be on the alert for the presence of the scapulocostal syndrome in all patients with complaints referable to the shoulder girdle. During the past 3 years, they found that 30 per cent of all middle-aged individuals presenting shoulder complaints (either traumatic or nontraumatic in origin) had the scapulocostal syndrome.

The condition is most commonly seen during the third and fourth decades of life, and both sexes are equally affected. Postural changes with roundshoulderedness and drooping of the shoulder girdle are underlying causative factors for the syndrome.

The most significant finding to assist in the diagnosis is a definite trigger point area of tenderness beneath the upper medial angle of the scapula in

conjunction with the posterior chest wall. This point may be determined by one of three tests:

In the first test the hand of the affected side is placed on the opposite shoulder with the arm at a horizontal plane. The examiner stands behind the patient on the normal side and, with one hand, draws the elbow across the chest, thereby exaggerating the adduction of the patient's arm. The thumb of the examiner's opposite hand is used to exert pressure in the region of the superior medial angle of the scapula, whereupon the patient will complain of extreme tenderness and, in most instances, radiation of pain into the affected areas.

The second test is carried out with the examiner standing behind the patient, holding the wrist of the affected side so that the arm is extended and internally rotated as far as possible. Pressure is exerted over the superior medial angle of the scapula with the examiner's free thumb. With this maneuver the scapula is angulated away from the chest wall, the upper border being used as a fulcrum. The additional pressure of the examining thumb will elicit pain, and the radiation may be produced or exaggerated.

In the third test the point of tenderness can be elicited by deep pressure of the examiner's thumb underneath the midportion of the descending fibers of the trapezius muscle, deep onto the posterior chest wall. At this site the anterior surface of the superior medial angle of the scapula is abetted. Reinforcement is produced by backward flexion and internal rotation of the arm.

In most instances there are no significant x-ray findings, although in some cases calcification in the region of the supraspinatus tendon may be noted. It is the opinion of the authors that, in view of the wide variety of erroneous diagnoses made on the initial examination, the patient should be examined carefully to rule out the presence of a scapulocostal syndrome, in spite of x-ray evidence of cervical arthritis or calcification in the subdeltoid bursa, or pain apparently due to other causes.

Treatment may be divided into two parts, preventive and definitive. Postural exercises to correct the round-shoulderedness and slight dorsal kyphosis are essential. Procaine, from 5 to 10 c.c. of a 1 per cent solution, injected into the subscapular tissues produces dramatic relief from the local tenderness and radiating pain. Injection is made with the patient holding the hand of the affected side on the opposite shoulder and the arm in a horizontal plane. In this position, the scapula is drawn laterally and the subscapular area is exposed. Codman corrective exercises are carried out in conjunction with the procaine therapy. Six case histories are presented.

RUDOLPH S. REICH, M.D.

**Chronic Stenosing Tenovaginitis of the Wrist.** CUSTIS LEE HALL and CARL BERG. *J. Internat. Coll. Surgeons*, 1950, 14: 48.

Stenosing tenovaginitis involving the abductor longus pollicis and extensor brevis pollicis tendon sheaths at the level of the radial styloid was described by De Quervain in 1895. It is increasingly prevalent and is often traceable to chronic occupational trauma of lifting or maintaining a position of flexion. Women are more commonly affected.

Symptoms are typical—pain of gradual onset, localized over the radial styloid, may radiate into the thumb or forearm. Grasping and lifting are painful, and functional weakness is common. A tender sausagelike thickening is present along the tendon sheath with limitation of extension and abduction of the thumb, and pain on ulnar deviation of the hand.

The acute phase usually presents as a mild aseptic inflammatory process, but fibrous changes supervene gradually with stenosis of the tendon sheath.

Conservative treatment, i.e., periodic relaxation of the hand and splinting of the first metacarpal, may serve to relieve the patient but frequently takes from 4 months to 2 years to accomplish it.

In the chronic stage, surgery gives prompt relief with less economic loss. Under local anesthesia, a transverse incision is made, and the small sensory branch of the radial nerve is isolated. The tendon sheath is split longitudinally to permit full release of the constriction. Early motion is encouraged, and normal use urged as soon as skin sutures are removed.

In 22 cases, complete relief was secured in from 2 to 6 weeks. FRANCES E. BRENNECKE, M.D.

**Considerations of a New Method of Roentgenographic Studies of Scoliosis in Relation to the Pathogenesis of the Curvature** (Consideraciones sobre una Nueva forma de estudio radiografico de las escoliosis en relacion con la patogenia de sus curvas). ANTONIO H.-ROS CODORNIU. *Cir. ap. locomotor*, Madr., 1950, 7: 127.

The author believes that the usual method of roentgenography is inadequate for obtaining a correct diagnosis of vertebral column curvatures. In 61 of 131 cases studied, it was seen that the primary cause of the deviation was from a deformity of the fifth lumbar vertebra; in 1 case it was pelvic asymmetry; in 8 cases, disproportion in the longitudinal axis of the lower members; in 26 cases, disproportion associated with a dimorphism and augmented by a twisting; and in 12 cases, a similar condition with partial compensation.

It is apparent that the smaller films, such as 20 by 30 cm. or even 30 by 40 cm., would be inadequate in demonstrating the true situation existing in the vertebral column. When a full length film is employed, however (60 by 24 cm.), it is possible to obtain a roentgenographic view of the vertebral column in its entirety. Deviation from the normal may be easily perceived and the relationship of the vertical to the horizontal plane is obtained. Moreover, the gravity function of the units may be observed and compared with the function of the articular surfaces. Only in this manner is it possible to differentiate the true status of the vertebral deviation, and determine whether it is of a dynamic or static nature.

Multiple curves may be seen in the full-length roentgenograph as well as the type of curve, the grade of curve, the reversibility of the curve, and the geometric relationship between the bodies and their gravitation function.

Therapy depends upon the nature of the curve and the condition of the vertebral bodies. Considerable emphasis is placed upon correction by means of an aluminum postural rectifier which may be employed both during and after operation. In the patients treated in this manner, encouraging results were obtained, and the author believes these warrant continued use of the apparatus.

STEPHEN A. ZIEMAN, M.D.

**The Treatment of Femoral Epiphysiolysis** (A propos du traitement de l'épiphysiolyse du col fémoral). A. WALCH. *Acta orthop. belg.*, 1950, 16: 103.

The first case of femoral epiphysiolysis reported by the author was that of a 12 year old boy who showed early osteochondritis of the left hip on x-ray examination. He was immobilized in an ambulatory plaster cast from December, 1941 to May, 1942. After this period of immobilization further examination revealed an epiphysiolysis of the femoral head following a severe attack of pain in the hip joint. Under general anesthesia the fracture was reduced and the plaster applied. A good result was obtained.

The second patient was a 30 year old woman who at the time of examination had a characteristic x-ray picture of a slipped femoral epiphysis. She was treated with traction and application of a plaster cast. The deformity of the femoral head and neck persisted although union took place. There was slight limitation of abduction but the patient was able to walk without a limp and very little discomfort. There were symptoms however of degenerative arthritis in the hip joint.

The third case was that of a 6 year old infant who presented at the time of examination a very severe case of epiphysiolysis with a great deal of slipping of the capital epiphysis. An osteotomy of the femoral neck was done with good results.

The fourth case was that of a 15 year old boy who was seen 1 year after his initial symptoms appeared. An osteotomy of the femoral neck was done and a nail was used to maintain position of the fragments. Later on an arthroplasty of the hip with a metal cup became necessary. Further observation showed that the nail passed through the hip joint into the pelvis, and it was therefore necessary to remove the nail and perform a metal cup arthroplasty of the hip. The result was satisfactory although there was some limitation of motion.

The fifth case was that of a 14 year old boy who presented an endocrine disturbance of the Froehlich type with a slipping of the femoral epiphysis. An open reduction was done and fixation was accomplished with a nail. Postoperatively, the patient was immobilized in a plaster cast maintaining abduction of the leg. After removal of the cast there was rigidity of the hip joint with no motion, and in spite of removal of the nail there was no gain in motion.

The sixth patient was a 26 year old male who had signs of epiphysiolysis for 14 years. Instead of trying to correct the deformity an acrylic head was inserted. The patient was immobilized in a plaster cast for 2 weeks postoperatively. After removal of the cast there was limitation of motion and although manipulation under general anesthesia was done, the motion in the hip joint remained very limited. Roentgenograms taken later on revealed dislocation of the acrylic head. Another operation was done to replace the head, which finally remained in a satisfactory position. The motion in the joint, however, remained poor.

The discussion was carried on by Verbrugge. He regretted the fact that early diagnosis of epiphysiolysis was not made in the diagnostic clinics of the University. He pointed out that the characteristic gait in this condition and the diagnosis on x-ray examination made the diagnosis fairly simple. If the cartilage covering the femoral head and acetabulum is preserved, hip nailing should be done, which allows the patient to be up and about within 2 weeks. In the cases of epiphysiolysis of the capital femoral epiphyses many surgeons do a subtrochanteric osteotomy or a wedge osteotomy of the neck. Unfortunately, this operation is followed by aseptic necrosis of the head in many cases. It was Verbrugge's opinion that replacement of the acrylic head is a poor operation. In early cases of slipped capital femoral epiphyses a nailing should be done, while in late cases an arthroplasty (according to Judet) is indicated.

GEORGE I. REISS, M.D.

**Rupture of the Quadriceps Tendon. Study of 14 Tendon Ruptures.** CARLO SCUDERI and EDWARD SCHREY. *Arch. Surg.*, 1950, 61: 42.

This report is based on a study of 14 tendon ruptures in 13 individuals (one patient having bilateral rupture of the quadriceps tendon). These patients were treated from September, 1938 to September, 1949. Twelve cases, all in males, were unilateral, and 1 case, in a female, was bilateral. The average age of these patients was 45.9 years, the ages varying from 24 years to 70 years. Nine tendons were operated on by the authors, while 2 were operated upon by other surgeons and referred to the authors for follow-up care. In each of these 2 cases, the suturing of the tendon was done with interrupted catgut sutures, with some resulting separation of the suture line and some loss of complete quadriceps extension power.

Two patients were seen late, one at 6 weeks and the other at 10 weeks following the original accident. One patient refused surgery and had a resulting knee that gave way especially when trying to go up and down stairs. The second patient went elsewhere to have surgery performed after recommendations were made.

The results obtained in the patients operated upon by the authors were classified as follows: good to

excellent results were obtained in 7 cases; a fair result was obtained in 1 patient who was 70 years of age, very apprehensive, and who refused to co-operate during physical therapy. One patient was a tabetic who, unfortunately, developed a skin slough with secondary infection resulting in complete failure.

At operation it was found that in most cases the site of the tear was ½ to ¾ inches from the superior margin of the patella. In none of the 9 patients operated upon by the authors has there been periosteal detachment of the patella.

The cardinal symptom of this condition is a loss of voluntary ability to raise the heel from the bed, while on palpation it is found that the patella lies below the normal location in the knee and that the patellar tendon is found firmly adherent to the inferior margin of the patella and the tibial tuberosity. This condition is frequently confused with fractures of the patella and patellar tendon rupture.

It was found that the patients operated upon soon after the accident did far better than those operated upon late because of retraction of the quadriceps muscle and tendon, resulting fibrosis of the quadriceps muscle, and periarticular adhesions that occurred from long disuse and interarticular hematoma formation with absorption and fibrosis. Patients operated upon within the first 48 to 72 hours were infinitely better than those operated upon after 2 to 3 weeks. Tendons operated upon early can be re-apposed and sutured in anatomical position without much tension, while in those seen late, considerable difficulty is encountered in pulling the tendon down to its normal position, and then an additional technical disadvantage is encountered due to the fact that the sutures have a tendency to cut through the friable reparative tissue. Longer immobilization also contributes its toll to the ultimate loss of knee flexion. Maximum return of function is not obtained under 9 months.

The knee is operated upon under a constrictor with a longitudinal incision over the anterior aspect of the knee; the ruptured tendon is re-apposed by the use of No. 00 chromic catgut mattress sutures and the tension is relieved from the catgut sutures by use of two Bunnell pull-out stitches. Number 30 wire is used with one pull-out stitch on each side of the midline of the knee joint. The Bunnell pull-out stitches are left in for 6 weeks. The patient is treated postoperatively with a cylinder cast extending from the groin to the ankle with the leg in complete extension. This is kept on for 1 month from the day of surgery. After that period the cast is removed and physical therapy and active and passive motions are recommended with moderate weight-bearing.

Physical therapy is most important and should be given daily by a competent physical therapist who understands the problem of quadriceps rehabilitation. Rough and forceful manipulation of the knee can produce a secondary rupture of the tendon even after this period of time. There is always some residual loss of flexion of the knee in these cases. In the cases that receive adequate care early, especially in the younger age group, almost complete return of knee flexion can be anticipated; however, in patients seen late after injury, and in some patients of over 35 or 40 years of age, the loss of knee flexion may amount to from 25 to 40 per cent of normal.

**Rupture of the Tendon of the Tibialis Anticus.** PAUL STRASSBURGER. *J. M. Soc. N. Jersey*, 1950, 47: 281.

The case history of a 64 year old man is reported. Rupture occurred at the tendinous insertion after two stress injuries several weeks apart. Surgical repair was performed by insertion of the proximal end of the tendon into the medial cuneiform bone. The result at the end of 6 months was very satisfactory. Six cases have been previously reported in the literature. KENATH H. SPONSEL, M.D.

**The Patella; Its Importance in Derangement of the Knee.** EDWIN F. CAVE and CARTER R. ROWE. *J. Bone Surg.*, 1950, 32-A: 542.

The authors present a study based on 18 cases in which the patella was considered to be the primary factor in knee derangement. In 12 cases the condition was due to chondromalacia and in 6 cases, to hypertrophic arthritis.

Berkheiser, in 1939, recommended excision of the markedly overgrown patella, and reported 11 operations. The authors agree with Kuhns that the patella is essential for the normal mechanics of extension at the knee, and that plastic procedures on the patella seem to give better functional results than complete removal. The authors have not removed hypertrophic spurs from the femoral and tibial condyles as recommended by Magnuson. They have resected the disintegrating portions of the patellar articular surface or, using a saw, have resected the posterior three-quarters of the patella and covered the raw surface with a flap from the infrapatellar fat pad.

Whenever an arthrotomy of the knee is performed, the patella must be examined by palpation and direct vision. DANIEL H. LEVINTHAL, M.D.

## SURGERY OF THE BONES, JOINTS, MUSCLES, TENDONS, ETC.

**Grafting of Homogenous Bone and Cartilage.** H. K. CHRISTIE. *Austral. N. Zealand J. Surg.*, 1950, 19: 320.

A series of 9 cases, illustrating the uses of homogenous bone and cartilage, is presented. In one case, a tuberculous bone cavity in the head of the humerus was curretted and packed with cancellous chips. These survived and became incorporated with the host bone. In another instance an infected knee joint from a compound fracture was arthrodesed with cancellous chips, and later a large cavity in the lateral condyle of the femur was successfully treated in the same way, after preliminary skin covering had been obtained by means of a travelling tubed pedicle graft. This case is interesting insofar as it presented the unfavorable combination of penicillin-resistant

organisms and a sclerosed cavity in the bone. Streptomycin was used with success. The cavity was packed and irrigated with eusol and saline for one week and thereafter packed four-hourly with streptomycin in 10 per cent solution. The use of cadaveric bone was illustrated in 2 other cases. In one of these the bone was refrigerated, and in the other it was not.

The article contains a discussion of the methods of dry and wet storage in the bone bank. The method of wet storage was used in the cases presented. The bone or cartilage bank is in the care of a bacteriologist who carries out the periodical tests. If penicillin and sulfa drugs have been utilized, the appropriate neutralizing compound will be required in cultures. In making the tests, both the graft, from which a small piece is snipped, and the supernatant fluid should be tested. Cartilage grafts will not survive desiccation, but if stored under conditions similar to those of the bone bank, will retain viability for long periods. Special properties are possessed by cancellous chip grafts. The chips are preferred from sites rich in red marrow rather than from places where the marrow contains much fat. Thus the crest of the ilium, the ribs, and tarsal bones are better than the upper end of the tibia. In the grafting of infected bone cavities with cancellous chips by the one-stage or two-stage method, a mixture of sulfathiazole and penicillin in the proportion of .05 gm. of sulfathiazole to 200,000 units of penicillin has been used. Parenteral penicillin is also given for 5 days. Antibiotics and refrigeration have opened a new chapter in bone surgery.

The homogenous graft has certain advantages:

1. In young children both quality and quantity of bone at the donor sites may be lacking. Damage may be done to an epiphysis in taking a graft from a child, or growth may be disturbed. Shock must be minimized in operating on children.

2. In certain bone diseases, e.g., fragilitas ossium, Paget's disease and osteoporosis, bone from another individual is to be preferred.

3. In debilitating diseases, e.g., tuberculosis of the spine, it is important to reduce operating time, shock, and loss of bone. C. Fred Goeringer, M.D.

**Flexor Tendon Grafts in the Fingers and Thumb.** Joseph H. Boyes. *J. Bone Surg.*, 1950, 32-A: 489.

The critical zone, called "no-man's land" by Bunnell, is that area in the hand lying between the distal crease of the palm and the middle flexion creases of the fingers.

The present study is limited to cases involving damage to the flexor tendons in this "critical zone." A total of 138 grafts were used in 118 patients. Twenty-three of these were in the thumb, 43 were in the index finger, 29 were in the middle finger, 13 were in the ring finger, and 30 in the little finger. Multiple tendon reconstructions were done in 11 patients.

The factors governing the end results were: cicatrix from injury or infection, stiffening of joints, trophic changes, and damage to more than one digit. Improvement in results has followed the use of the Bunnell type of stainless steel in place of silk, combined with meticulous excision of scar and sheath tissue. The palmaris longus was the best tendon for grafts. Daniel H. Levinthal, M.D.

**Oblique Displacement Osteotomy for Osteoarthritis of the Hip Joint.** G. V. Osborne and W. H. Fahrni. *J. Bone Surg.*, 1950, 32-B: 148.

Clinical evidence is advanced which indicates that the end results of the displacement osteotomy for osteoarthritis of the hip joint, when correctly performed, is successful in relieving pain and in diminishing disability. Experimental studies of the mechanics of the hip joint were made in determining the line of gluteal pull and the line of weight-bearing.

The effect of the McMurray displacement osteotomy in osteoarthritis of the hip is to diminish the load carried by the head of the femur, first by correction of deformity, and secondly by a "pelvic support" action. The beneficial effect of displacement osteotomy in osteoarthritis of the hip is due first to correction of deformity, and secondly to the bone block effect of the displaced shaft, which prevents further development of the adducted position and may act as a pelvic support. Ideally, the postoperative radiograph should show the Y or bifurcation appearance, and all such cases in this series have gained a good lasting result.

In detail, the distal fragment should be displaced below the inferior acetabular rim, and the proximal fragment should lie adducted so that apposition of the two fragments is maximal, and union correspondingly rapid. If a severe flexion deformity is present the intertrochanteric region of the femur is situated on a plane anterior to the acetabulum. In such a case the distal fragment of the osteotomy, when extended, is liable to be displaced forwards into the adductor muscle mass instead of below the hip joint. In this situation the fragment is held forward by the contracted psoas muscle, which subsequently may pull it upwards in front of the neck of the femur. The result is a failure of the operation, gross shortening of the leg, and often a painful pseudarthrosis. In order to avoid this complication, a flexion deformity of more than 35 degrees should be overcome by preoperative traction; if smaller it can often be corrected by manipulation immediately before osteotomy. When, in spite of these measures, obvious deformity still persists, an oblique osteotomy should not be undertaken.

In the postoperative treatment, it was found that flexion was essential to discourage forward riding of the shaft in front of the neck. This flexed and abducted position is maintained for two and a half weeks, when the early stages of union are sufficiently advanced to prevent the displaced fragment from slipping from its new site. When the second plaster is applied the leg is restored to the midposition, the flexion and abduction being corrected simultaneously. Union of the osteotomy usually occurs within

3½ months. The second plaster is then removed and the patient is allowed weight-bearing exercises. Slow but steady improvement takes place during the subsequent 6 to 9 months. Ninety-three operations were performed with 3 deaths. Seventy-five cases have been followed.

Gross limitation of movement was due to the following causes: (1) previous operative interference such as a failed arthrodesis or arthroplasty; (2) severe osteoarthritis with complete loss of joint space secondary to traumatic or infective arthritis; (3) high osteotomy, with inadequate displacement, the distal fragment lying directly under the femoral head and impinging against the hypertrophic bone in the floor of the acetabulum.

No clinically successful case reviewed here has shown radiographic evidence of progress of arthritis. There have, in fact, been many examples of partial restoration of joint space. The articular surfaces have become more clearly defined and regular in outline. The authors also discussed the complications of the operation, limitation of knee movement, knock knee, nonunion, persistent pain (the latter cases showing absence of the block to adduction movement, which is the index of pelvic support and the criterion of a successful mechanical result.

C. Fred Goeringer, M.D.

**The Treatment of Quiescent Tuberculosis of the Hip Joint by Excision and "Dynamic" Osteotomy.** Adam Gruca. *J. Bone Surg.*, 1950, 32-B: 174.

For all types of late pseudarthrosis resulting from tuberculous destruction of the hip joint, the authors have obtained best results by removing all infected tissues during the quiescent phase of the disease and by excising the remains of the head and neck of the femur, of the capsule and the acetabulum, and remodelling the upper end of the femur. The new joint should reproduce the normal static and mechanical conditions except that (1) no weight should be borne by the old acetabulum; (2) the lever arm of the abductors should be longer than normal to compensate for the loss of power in these muscles; and (3) the point of support of the pelvis should be shifted toward the axis of the body. These requirements can be fulfilled by excision of the hip joint, followed by a step-cut osteotomy of the upper end of the femur; the upper fragment is angulated to support the pelvis at a point beneath the acetabulum. The principles and technique of the operation are described and well illustrated.

When the correct levels of section have been calculated, the upper end of a Z-shaped metal plate is driven into the trochanteric mass and secured by a screw. The bed for the metal plate is prepared by a small chisel driven into the bone in the required axis. The Z-line of section of the bone is next marked out by drill holes. The bone is cautiously divided through half its diameter along the upper and lower transverse lines, and then split longitudinally. Care must be taken to avoid fracture of the femur. By using the spike in the trochanter, the upper fragment is placed in extreme adduction with its lower end pointing towards the obturator foramen. The position of the limb is then so adjusted that the two fragments form a right angle, and this position is maintained temporarily by a clamp. The plate is fixed securely to the femur by two or more screws, and a final anteroposterior screw holds both fragments together where they cross. The iliopsoas tendon is sutured under moderate tension to the posterior periosteum of the femur. The reflected part of the vastus lateralis is sutured to the periosteum of the upper fragment and the lateral part to the fascia of gluteus medius. The wound is closed in layers with catgut and the hip is immobilized in a plaster spica. Six weeks after operation the spica is removed, a roentgenogram is taken, and passive movements, massage, and radiant heat baths are begun. Full weight-bearing and unrestricted exercises are permitted after 12 weeks.

Between 1932 and 1949, 224 hips have been operated upon, 208 by the technique reported in 1946, and 16 by the new procedure. Early results were satisfactory in nearly 90 per cent of cases; these patients had a painless stable joint and a range of movement varying from 40 to 100 per cent of normal. In one-third of these cases there was shortening of the affected limb up to 2 cm., but many patients had real lengthening of 1 to 2 cm.

The operation is contraindicated (1) in the active stage of tuberculous disease; (2) in the presence of infected sinuses (if treatment with penicillin and streptomycin fails, the excision of infected bone is carried out first and the osteotomy is performed some months after healing of the sinuses); (3) where there is gross atrophy of bone and muscle after tuberculosis in early childhood; and (4) when the general condition is unsatisfactory.

C. Fred Goeringer, M.D.

**Pseudarthrosis of the Hip Joint.** R. G. Taylor. *J. Bone Surg.*, 1950, 32-B: 161.

Pseudarthrosis is a most satisfactory and reliable operation in ankylosing spondylitis, and in patients over 60 years of age with disabling osteoarthritis. The authors admitted that the more formidable operation of cup arthroplasty may prove to be superior in younger patients with osteoarthritis. The scope and nature of the pseudarthrosis procedure is to relieve pain and to restore mobility and limited function. It does not restore normality. Other advantages claimed for the procedure are that it corrects deformity, restores free movement, and the benefit gained is permanent. A remarkable degree of stability is preserved.

Ninety-three cases were reviewed. The average age of the patients at the time of operation was 55 years; the oldest was 75 years and the youngest 20 years. Thirty-nine patients were men and 54 were women. Among the cases of bilateral osteoarthritis 6 patients whose more painful hip had been operated on gained satisfactory relief and were able to walk with the aid of two sticks or crutches. Five patients whose

opposite hip had previously undergone arthrodesis walked with the aid of two sticks; it is noteworthy that of these 5, 2 later developed stress fractures in the subtrochanteric region on the side of the fusion. One required abduction osteotomy, but both are now walking well with the aid of two sticks. Although the results are less satisfactory in bilateral disease, the relief that can be gained, if only in one hip, is nevertheless sufficient to make the operation well worth while. The best results so far obtained in bilateral osteoarthritis are those in which arthrodesis was performed on one side and pseudarthrosis on the other.

The single patient with unreduced fracture-dislocation of the hip joint gained an excellent result. The operation was performed at the age of 26 years. Six years later she stood and walked well without pain, and there was active hip flexion of 80 degrees. One patient with tuberculosis of the hip was operated upon. There was no sign of reactivation 4 years later. Eleven cases of ankylosing spondylitis were reviewed, 7 after unilateral pseudarthrosis and 4 after bilateral pseudarthrosis. With 1 exception the results were satisfactory. In the 10 successful cases the patient was able to walk reasonably well with two sticks and to sit with comfort. One patient with this condition had a good range of well controlled movement in the pseudarthrosis 20 years after unilateral operation. In the light of more recent work, bilateral pseudarthrosis is recommended in this disease. Moreover, a raised sedimentation rate is not regarded as a contraindication to operation; in 1 case of persistent severe pain in the hip, operation was performed in the presence of a sedimentation rate as high as 120 mm. in an hour.

The technique of operation, postoperative management, and comments on the poor results obtained are also included in the paper. The author makes use of a broad gouge on the anterior and upper rim of the acetabulum which is removed. The gouge enters the bone ½ inch above the upper margin of the acetabulum and is directed to reach the socket an inch or so inside. The neck is divided at its distal end, preferably with a hand saw or a Gigli saw, and the head and neck are removed. Sharp edges of bone are smoothed with a nibbling forceps or fine chisel. The wound is closed, steady traction on the limb being maintained by an assistant.

C. FRED GOERINGER, M.D.

**The Use of an Artificial Femoral Head for Arthroplasty of the Hip Joint.** JEAN JUDET and ROBERT JUDET. *J. Bone Surg.*, 1950, 32-B: 166.

The authors describe a special procedure for arthroplasty of the hip, "resection reconstruction," or excision of the pathological femoral head and its replacement by an artificial head made of a synthetic plastic material which is firmly fixed to the upper end of the femur. Three hundred cases were studied, the earliest of which dates back some 3.5 years. For a result to count as good, the patient should be able to walk for ½ hour or even a full hour without pain; movement in the hip should be restored to 90 degrees of flexion and 30 degrees of abduction. In contrast, most of the patients with a poor result have almost no movement in the hip; the stiffness is commonly accompanied by an adduction deformity which advances despite the usual orthopedic measures. Such poor results are easily explained if one considers the new mechanical conditions after Whitman's reconstruction. The femoral neck, which is about 30 mm. in diameter, articulates with an acetabulum which is at least 50 mm. in diameter. With regard to flexion, 60 per cent of the patients reach or pass 90 degrees, 30 per cent have from 60 to 90 degrees, and only 10 per cent fail to obtain 60 degrees of movement. One-third of the patients do not require a stick for walking, but two-thirds do. The return of function is variable but often remarkable; 80 per cent of the patients are able to return to work, and some can walk several miles, ride a bicycle, and do a heavy day's work.

The shape of the prosthesis resembles that of a mushroom with a rounded head and a long stem. The outer surface of the head forms two-thirds of a sphere and is highly polished. The under surface of the head is hollowed out to allow it to fit on the stump of the neck of the femur. The stem is long enough to transverse the remainder of the neck and penetrate the lateral cortex of the femur. For simplicity, the heads are made in three different sizes, each with three different lengths of stem. In this way a prosthesis for any case is always available. Rather than metal for the prosthesis, the authors preferred to use an acrylic resin or methyl polymethacrylate, which is a polymer of methyl acrylic acid. This plastic is not attacked by organic acids and is unaltered by a long stay in the body. In 12 of the early patients the stem of the prosthesis fractured after operation. A steel core was then added to the prosthesis and this in turn was completely surrounded and insulated by the acrylic resin. From the roentgenological aspect, a somewhat inconvenient property of polymethacrylate is its translucency to the x-rays. On the other hand, this allows complete examination of the structure of the bone in contact with the prosthesis. In 150 patients observed over various periods between 6 months and 3.5 years, no osteoporosis of bone has been visible in the roentgenograms. In half of the cases the range of movement after 2 or 3 months was excellent, and light work could be resumed. In other cases recovery was slower and partial incapacity lasted from 6 to 8 months. In no case was the pain made worse by operation. Seven patients of 10 had either no pain or a negligible amount. This freedom from pain is quite remarkable when one remembers that intensity of pain was the main indication for operation.

The "resection reconstruction" operation is suitable for the treatment of four types of lesion: osteoarthritis, ununited fracture of the femoral neck, nontuberculous ankylosis, and dislocation of the hip. Three deaths have occurred after 300 operations,

possibly from improper selection. The authors have operated on 20 patients with ununited fracture of the femoral neck with considerable success. A complete discussion of the operative technique is given.

C. FRED GOERINGER, M.D.

**Osteogenic Sarcoma of the Femur and Tibia, Treated by Resection and Massive Bone Grafts** (Sarcomes ostéogéniques du fémur et du tibia traités par résection segmentaire et greffe massive). E. DELANNOY, VERHAEGHE, and G. LAGACHE. *Lille chir.*, 1950, 5: 55.

In the last half century many different treatments for bone sarcoma were employed. These were: conservative therapy, partial resection, x-ray therapy, immediate amputation, and delayed amputation. The fact still remains that we do not have any definite solution to this problem.

The author presents 1 osteolytic sarcoma and 2 osteogenic sarcomas in 3 patients ranging from 14 to 32 years of age.

The results of partial resection and insertion of massive bone grafts compared favorably with those obtained by amputation. The author explained this fact by stating that in major surgery, such as an amputation, neoplastic cells travel more rapidly to the lungs and cause pulmonary metastases, while in minor surgery, such as local resection, this does not take place as rapidly. When massive grafts are inserted an intramedullary nail is used to assure rigidity and maintain the apposition of the graft and the bone fragments. In 1 case an acrylic prosthesis was used to maintain motion in the hip joint.

GEORGE I. REISS, M.D.

## FRACTURES AND DISLOCATIONS

**Treatment of Fractures, with Long-standing Osteomyelitis. Results of Use of the Tibial Sliding Graft.** PAUL WALLACE. *Arch. Surg.*, 1950, 61: 379.

The author reports his observations on the treatment of fractures with long-standing osteomyelitis, and specifically the results in 25 consecutive cases of tibial fracture.

The average interval from the time of the occurrence of injury to the time of the graft was 30.8 months, and in these same cases an average of 15.8 months of continuous active infection was present following injury. These were "bottom-of-the-barrel" cases in which the final operation was performed at an average of 30 months after surgery. All cases were characterized by the presence of many handicaps: (1) there was more soft tissue damage, more scarring and impairment in circulation, than in the post-war injury cases; (2) there were greater numbers of severe injuries to start with, than in the average case; (3) the infections were most resistant and virulent; (4) the involved patients were in a condition which could be classed only as poor, constitutionally; (5) a small percentage of the patients were unco-operative, and their proper treatment was interfered with by their actions; (6) drainage was encountered for as long as 28 months after injury. Lastly, there was prolonged immobilization and disuse leading to decreased circulation, marked diminution in circumference of the extremity, fibrosis, and almost irreparable changes and damage to the joints.

The technique followed was that of preparing a sliding tibial bone graft, following an incision on the anteromedial aspect of the tibia. Occasionally, in a doubtful case, a scar was excised first as a test operation to see if the infection would flare up. If no infection occurred, bone grafting was done as soon as the wound healed. The grafts were driven or wedged in place. Metal was avoided. Antibiotics were routinely used one day before surgical intervention, and afterward until the temperature had been normal for 2 days. Wounds were closed with surgical gut for the periosteum and subcutaneous tissues, and with black silk or wire for the skin. The average age of the patients was 27 years. The length of time from accident to final grafts averaged 30.8 months. The length of time from the surgical grafting to the time of walking with brace or without external support averaged 6.7 months.

From his analysis of the 25 consecutive cases, the author concludes:

1. All soft tissues must be healed at the projected operative site, and it is well to avoid scarred areas as far as possible.

2. After protracted severe infections, it is wise to wait 6 months before attempting a bone graft procedure.

3. It is very necessary to plan an atraumatic technique; especially is it important to avoid disturbance to the fracture site.

4. Metallic fixation is condemned in cases of this type.

5. Massive grafts of bone are to be avoided as they may overload the tissues. It was surprising to note the amount of regeneration that took place with relatively small grafts.

6. The maintenance of postoperative position is important. The casts commonly were applied with the knee at 45 degrees of flexion for the first month to prevent rotation and displacement. Early activity was encouraged whenever possible.

KENNETH SHERMAN, M.D.

**The Importance of Intramedullary Stimulation in the Healing of Fractures** (Die Bedeutung des Markraumreizes fuer die Frakturheilung). RICHARD MAATZ. *Beitr. klin. Chir.*, 1948, 177: 363.

The intramedullary nailing of Kuentscher has shed new light on the formation of excessive callus. Stimulation of the bone medulla causes cortical necrosis which is replaced by newly formed periosteal bone tissue. The amount of callus formation does not depend upon the chemical stimulus but upon the amount of cortical destruction. This takes place when the physical properties of the cortex are being changed, because of mechanical, chemical or thermal irritation.

Periosteal callus formation is maximal in young people and absent in older individuals. If changes take place they are reversible, and after the reaction has subsided the bone assumes its original shape. The periosteal callus caused by chemical, thermal, or mechanical medullary stimuli develops independently from the fracture callus and does not increase the speed of bony union; however, it may lead to delayed union or pseudarthrosis.

ERNEST H. BETTMANN, M.D.

**Osteosynthesis by Means of Springs** (Osteosynthese mit Feder). RICHARD MAATZ. *Deut. Zschr. Chir.*, 1949, 263: 201.

The author, who reports on 80 patients with fracture who were treated with internal spring fixation during the past 5 years, states that every bone can be forced to heal if the ends are kept together. Three types of springs are employed for the osteosynthesis: the spongiosa, medullary, and the ligature spring.

The spongiosa spring, consisting of a distal wire screw and a proximal flat spiral spring, is employed for intra-articular or juxta-articular fractures (olecranon, tibial plateau, malleoli pseudarthroses).

The medullary spring consists of a proximal tension wire with an additional spreader device and screw bolt. It is employed for arthodesis of the shoulder, hip, hand, and ankle joint and in nonunited humerus fractures. There were 21 cases with solid union in 3.5 months. The tension of the spring can be increased after a few weeks. In the ulna the spring fixation is combined with intramedullary nailing.

The ligature spring consists of a wire which has two separate spring segments that keep two bone fragments firmly together in the transverse direction. It is also most useful in the fixation of bone transplants. ERNEST H. BETTMANN, M.D.

**Internal Rotation Dislocation of the Shoulder. Report of a Case.** L. S. MICHAELIS. *J. Bone Surg.*, 1950, 32-B: 223.

The author had the opportunity of determining accurately the nature of the pathology during open reduction in a case of internal rotation dislocation of the shoulder. Original roentgenograms were reported as showing nothing abnormal; anteroposterior and lateral radiograms and stereoscopic films had been made. Four weeks later pain and limitation of movement were still present and the patient was subjected to the open reduction procedure.

On examination, the left humerus was found to be held in maximal adduction and internal rotation. The head could not be palpated either in its normal place or anteriorly, nor was it present in one of the two typical positions of posterior dislocation. No movement of the shoulder was possible; fixed adduction was so extreme that pressure of the elbow had left a red mark on the skin of the patient's flank. There were no signs of vessel or nerve involvement. Examination under an anesthetic confirmed that the shoulder was still firmly locked. Some scapular movement was possible, but no true shoulder movement. Operation was undertaken 5 weeks after the accident. The shoulder was exposed through Bankart's anterior approach. The subscapularis tendon was found to be stippled with old hemorrhages and adherent to the capsule. The capsule, the front of which was thickened and rather slack, was incised. It was then seen that the greater tuberosity of the humerus was directed forward, and that the neck of the humerus faced the glenoid. The articular surface of the head of the humerus could not be seen; the head, rotated inward through nearly 90 degrees, was clearly locked at the posterior rim of the glenoid. Reduction was achieved by strong traction and lateral rotation. Multiple adhesions to the posterior part of the capsule were divided.

When the films were restudied it was observed that the upper end of the humerus maintained a relationship to the glenoid, not by its articular surface as in the normal shoulder, but by the anterior aspect of the neck. Early diagnosis alone can ensure early reduction by manipulation, which in the first few days should present very little difficulty. Since roentgenography cannot always be relied upon to provide clear evidence of displacement, diagnosis should be based on the clinical findings of locking of the limb in adduction and inward rotation.

C. FRED GOERINGER, M.D.

**Winged Fractures of the Apophyseal Articulation of the Vertebrae** (Fracturas aisladas de las apofisis articulares de las vertebras). L. DE LA SIERRA CANO and D. MORANTE SERNA. *Cir. ap. locomotor*, Madr., 1950, 7: 212.

Winged fractures of the apophyseal articulation of the vertebrae are extraordinarily rare. The author discusses such fractures and presents a case in which the apophyseal articulation of the fifth lumbar vertebra was involved. Roentgenographic studies of the vertebral column revealed a hairline fracture of the right inferior process in addition to the original spondylolysis of the vertebral column. There was a clear displacement of the fragments to such an extent that in one position a 15 degree separation from the middle line could be observed. The deformity resulted in an extremely painful syndrome. A vertebral fusion according to the method of Albee was accomplished and resulted in almost immediate relief of the pain and ultimate correction of the deformity.

Discussion of the various cases reported in the literature brought out the difficulty of correct roentgenographic interpretation of the fracture, the different methods of handling this type of fracture, and the mechanism involved in its production.

STEPHEN A. ZIEMAN, M.D.

**Congenital Dislocation of the Hip. Development of the Joint After Closed Reduction.** ERIK SEVERIN. *J. Bone Surg.*, 1950, 32-A: 507.

Arthrographic study permits strict differentiation of dislocation, subluxation, and dysplasia. The size of the femoral head, the cartilaginous roof of the acetabulum, the adaptation of the head to the

acetabulum, and the width of the capsular isthmus can be studied. One can determine whether or not the ligamentum teres is present. After reduction the kind, or the degree, of any soft-tissue barriers can be judged. By repeated arthrograms, the development of the joint can be followed, and the proper course of treatment determined.

The authors present 115 cases of congenital dislocation of the hip; in 38 cases the condition was bilateral and in 39, unilateral. All were treated during the period from 1937 to 1940, by closed reduction. Three cases seen during the same period were not included in this series because all attempts at reduction were unsuccessful. Most of the patients were treated before the age of 3 years. All were under 5 years of age, and in 2 patients treatment was begun before the infants were a year old.

The technique consisted of careful reduction over the posterior edge of the acetabulum. Arthrograms were made at the time of reduction. A plaster spica cast extending to above the knees was applied, to allow rotary movements of the heads in the acetabula. Movement was encouraged. After a period of 3 or 4 months the patient was changed to a varnished wooden cast in which, by supple saddle girths, his limbs were kept in the same position as when in the plaster. Careful creeping and walking exercises were started. Six or 8 months after the beginning of treatment the patient was allowed to move about freely, except that abduction treatment was continued at night, and for at least 2 or more hours during the day for 2 or more years after reduction. During the afternoon nap, abduction was also maintained.

The author differs with Leveuf who stated that complete congenital dislocation of the hip could never be properly treated by closed reduction.

The investigation by the author has shown that:

1. In the great majority of cases of complete congenital dislocation of the hip, soft tissue is interposed between the femoral head and the acetabulum immediately after the reduction.
2. The soft-tissue barrier is gradually overcome if the head is kept against the acetabulum.
3. The interposition of soft tissue had no bearing on the outcome in these cases; thus, in itself, it is not an indication for open reduction.
4. The reduction is stimulating to the growth and development of the joint.
5. When the described principles of treatment were followed, the late results of closed reduction of congenital dislocation of the hip were sufficiently good to justify further work along these lines.
6. Open reduction should be reserved for the very few cases in which closed reduction is unsuccessful.
7. Closed reduction is preferred in congenital dislocation of the hip. DANIEL H. LEVINTHAL, M.D.

**Congenital Dislocation of the Hip. Method of Grading Results.** WILLIAM K. MASSIE and M. BECKETT HOWORTH. *J. Bone Surg.*, 1950, 32-A: 519.

The basis of this report is a study of 44 cases (58 hips) observed at the New York Orthopaedic Hospital. All hips were treated by open reduction, and patients were followed until they reached adult life.

The authors' report is divided into three parts, and the present article constitutes the first of these. The various and inaccurate methods of evaluation of end results presented heretofore are described. Wiberg, in 1939, described a measurement of the femoral head-acetabular relationship in adult hips which he called the CE angle. Severin, in 1941, published a complete follow-up study of 417 hips treated by closed reduction, and followed from 5 to 27 years. He utilized the CE angle of Wiberg, and divided the roentgenographic and anatomical findings into six groups. Like Putti, Severin graded the functional results separately.

The system of grading presented here more nearly meets the requirements set forth than have others presented in the literature. This system attempts to standardize all important findings, so that various observers can arrive at the same grade for any given hip. It makes possible a comparison of the same hip at various ages, which (as will be shown in Part II) is valuable information. Those findings of least accuracy are grouped together and do not lessen the accuracy of the whole. The physical findings are more accurate than the symptomatic observations but they too would not be graded exactly alike by two observers, since an estimate of the degree of limp and of hip motion will vary even between two careful observers.

The roentgenographic grade depends for the most part on actual measurements which can be checked by more than one observer and, although these, admittedly, vary somewhat with changes in projection of the roentgenograms, it is believed that this variation can be minimized by attention to details. The same plan of grading results, with some modification of the basic roentgenographic factors, can be used in evaluating the long term results of therapy in other hip conditions.

DANIEL H. LEVINTHAL, M.D.

**Medullary Nailing of the Femur. Comparative Study of Skeletal Traction, Dual Plating, and Medullary Nailing.** DANA M. STREET. *J. Am. M. Ass.*, 1950, 143: 709.

The evolution of treatment of femoral shaft fractures is presented. Medullary nailing provides internal splinting and obviates the need for external fixation. It is analogous to nailing in the femoral neck. The nail, by spanning the medullary canal and extending to nearly its entire length, effectively controls displacement, angulation, and rotation. Since joints are not restricted by traction or immobilization, and the muscles are not transfixed by pins, joint motion and muscle power are readily maintained. The physiologic pressure exerted by muscle tone and early weight-bearing tend to close the fracture line and promote early union.

If medullary nailing is done by open reduction, a minimum of manipulative skill is necessary, special instruments are essential, potentialities of infection

are great, the joints are freely movable, and duration of disability is the shortest.

A comparative study in rotation of skeletal traction, dual plating, and medullary nailing was undertaken. Seventeen fractures were treated, after which the nailing procedure appeared to have such great advantages that the other two methods were abandoned except in unusual circumstances.

Of the 5 cases in which traction was used, 1 fracture was not satisfactorily reduced; in this case plating was done; a total of 6 fractures were treated by dual plating. For statistical purposes, in this report of medullary nailing, 5 fractures were reduced by the open method and 5 by the closed method—the open method providing retrograde insertion of the nail at the fracture site, and the closed method providing antegrade insertion with manipulation of the fracture under radiographic control.

The anatomic results in the 20 patients studied in this series are presented in tabular form. Callus appeared about the same time in all types of treatment, as did consolidation of the fracture; however, some shortening and angulation occurred in the group treated by traction. Atrophy of the thigh was less in those patients with nailed femurs. Complete knee motion returned in 3 to 6 months in cases in which nailing was done; this is about half the time necessary in cases treated by traction and plating.

The patients treated by nailing required about one-half the usual time as regards recumbency, period of time until full weight bearing, discharge from the hospital, and period of disability, compared to the groups treated by traction and plating. The shortest period of disability occurred in those patients having closed nailing procedures.

The author believes evidence is presented which indicates that the processes of fracture healing are not significantly disturbed by methods of internal fixation. Anatomic and functional results are better with internal fixation than with skeletal traction. Hospitalization and total disability are shortest with medullary nailing, which is recommended as the treatment of choice in suitable fractures of the femoral shaft, when operative facilities permit.

A total of 60 fractures of the femoral shaft have been treated without a single poor result.

KENATH H. SPONSEL, M.D.

**Luxations in the Tarsometatarsal Joint of Lisfranc** (Luxace v Lisfrankově kloubu). KAMIL TYPOVSKÝ. *Lék. listy*, 1950, 5: 311.

Four cases of dislocation at the tarsometatarsal joint have been treated in the Department of Surgery of the Palackÿ University in Olmuetz, Czechoslovakia.

The first case, the result of striking the foot against a solid object, consisted of a fibular and dorsal dislocation of the four lateral metatarsals, the first metatarsal remaining in its normal position. The latter bone, however, was fractured, as was the first cuneiform bone. The injury was now 14 days old and, since the medial portion of the arch, so important for walking, was intact, no attempt was made at open reduction. A plaster cast was applied for 6 weeks and the result was satisfactory.

The second case, also the result of striking the foot against a resistant object, consisted of a fibular dislocation of the fourth and fifth metatarsals and a contralateral dislocation of the first metatarsal. This dislocation involved the medial portion of the arch as far as the joint of Chopart. In this patient there was an open fracture of the third metatarsal and much crushing of the tissue on the dorsum of the foot. The latter complication presented more than a partial reduction of the contralateral dislocation of Chopart's joint.

The third dislocation was the result of a fall from a gymnasium apparatus. The injury consisted of a homolateral dislocation, that is, all the metatarsals were dislocated dorsally, and there was a fracture of the base of the first metatarsal. In this case the deformity was successfully reduced and held in place by a wire suspension through the distal phalanx of the great toe. Later the foot was put up in a plaster cast for 6 weeks. When the cast was removed the roentgenologic examination disclosed a marked atrophy of the bones of the foot. After a rather long period of radiation treatment the bone atrophy disappeared. The ultimate results were good.

The fourth case, also the result of a fall during gymnastic exercises, consisted of a typical divergent dislocation, that is, there was a moderate amount of dorsal displacement of the second and third metatarsals and a plantar dislocation of the first metatarsal, and there was a complicating fracture of the corresponding cuneiform. The correction of the deformity was successfully accomplished. The part was put up in a plaster cast for 6 weeks and subsequently an adhesive plaster dressing was applied. Six months later the patient had resumed his duties as a military officer and was a competitor for the Tyršův emblem for efficiency. A control roentgenogram 2 years after the accident disclosed mild atrophy of the cuneiform bones which has not caused any trouble.

The dislocation is believed to be the result of a tendency inherent in the oblique direction of the Lisfranc joint in relation to that of the long axis of the foot. It does not occur in children since here the axis of the joint is almost at right angles to the long axis of the foot. JOHN W. BRENNAN, M.D.

## ORTHOPEDICS IN GENERAL

**An Experimental Study of Tendon Growth in the Rabbit.** G. N. C. CRAWFORD. *J. Bone Surg.*, 1950, 32-B: 234.

In the present experimental study on tendon growth, the author utilizes the technique employed by Warwick and Wiles in their study of the growth of periosteum. Marks were made with India ink along the periosteum of young rabbits and the distance between the marks was measured at the time of operation and again after an appropriate period of

growth. With this technique the growth of periosteum was found to occur along the whole length of bone and not merely at the region of the epiphyseal cartilage. In the investigation of tendon growth, small marks were made at intervals along the length of tendons in the limbs of young rabbits, and the distance between the marks was measured during the operation. The rabbits were killed 2 to 3 months later, and the amount of longitudinal growth that had occurred was determined by remeasuring the distance between the marks.

Rabbits of about 1 month old were used. These are readily obtainable, their tendons are of a convenient size, and, although growing rapidly, they stand the operation well. The tendons most convenient for study, on account of accessibility and adequate length, were those of the tibialis anterior, extensor hallucis longus, and the peroneal muscles. Muscles (e.g., gastrocnemius) whose fibers have a complicated junction pattern with the tendon were avoided, because interpreting growth processes near the muscle-tendon junction would have been more difficult. Since the intention in this first series of experiments was to secure qualitative rather than quantitative data, no special precautions were taken to ensure that all the animals used were of precisely the same breed, age, and size. Only a small series of rabbits was used for each particular tendon studied. It is possible that the rate of growth increases again near the insertion of the tendon; but further experiments are necessary to determine this conclusively. There is no reason to suppose that the growth of tendons follows a different pattern in other mammals, but here also confirmatory experiments are required. C. FRED GOERINGER, M.D.

**Stenosis of Carpal Tunnel, Compression of Median Nerve and Flexor Tendon Sheaths, Combined with Rheumatoid Arthritis Elsewhere.** L. S. MICHAELIS. *Proc. R. Soc. M., Lond.*, 1950, 43: 414.

The case is that of a female patient, former dancer, and more recently a factory worker, who developed intense radiating pain from the right wrist to tips of her fingers, numbness, and limited motion. Within a period of 4 years, small lumps appeared above and below the carpal ligament of the right wrist. Moreover, stiffness and permanent swelling ensued in both shoulders and fingers of the affected hand without, however, any appreciable ulnar deviation of the hand.

At operation the carpal ligament was cut. The median nerve showed definite signs of compression with the presence of synovial fluid in the region of the flexor tendons. The right shoulder was also explored and about 60 c.c. of straw-colored fluid issued therefrom. A small giant-cell synovioma was extirpated from the volar surface of the right thumb. Following surgery, the patient made an uneventful recovery.

This case differs from any thus far reported in that it had the unusual concomitant of rheumatoid arthritis and stenosis of the carpal tunnel.

SAMUEL L. GOVERNALE, M.D.

**Comment on the Problem of Calcified Nucleus Pulposus** (Beitrag zur Frage der Verkalkung des Nucleus Pulposus). KARL GIULIANI. *Zschr. Orthop.*, 1950, 79: 279.

Differentiation is made between the calcification of the annulus and calcification of the nucleus pulposus. Most of the patients observed had a history of tuberculosis, typhoid fever, spondylitis, or injury. There were no symptoms in these patients, but mild vague symptoms sometimes occur. Local acidosis or vascular damage has not been proved a causative factor. In 2 cases spondylitis with calcification of the nucleus pulposus developed in the spinal canal.

ERNEST H. BETTMANN, M.D.

**The Clinical and Diagnostic Significance of Nucleography** (Klinische und diagnostische Bedeutung der Nukleographie). PH. ERLACHER. *Zschr. Orthop.*, 1950, 79: 273.

In spite of the statement that lumbago or sciatica means disc disease, conservative treatment should be tried first. Among 50 patients with positive myelograms there were 6 with negative operative findings. The neurological signs were not always conclusive as to the localization because of variations in the dermatome distribution. The trunk list to one side was due to the tendency to avoid nerve root pressure and the patient assumed the position in which there was the least nerve pressure.

Erlacher developed a direct contrast method of diagnosis by injecting the nucleus pulposus (nucleography). The technique of paradural nucleography is as follows:

With the patient in the lateral position and after anesthesia of the paraspinous area, a spinal anesthesia needle 10 cm. long is introduced one finger's breath from the spinous process. After the needle overcomes the hard elastic resistance it is pushed forward 1.5 cm., and from 2 to 3 c.c. of 50 per cent aqueous iodine solution are injected. The needle is then withdrawn and roentgenograms are taken. The patient sits up and bends forward and backward. All data concerning the position, shape, and extent of the contrast medium can be obtained since the whole nucleus pulposus and all of the traumatic changes can be demonstrated.

The author considers this procedure harmless and recommends it for all disc herniations. He anticipates a decline in the number of operations due to negative findings. ERNEST H. BETTMANN, M.D.

**Open Operation for Congenital Dislocation of the Hip. Results in 44 Cases (50 Hip Joints).** EIVIND PLATOU. *J. Bone Surg.*, 1950, 32-B: 193.

Open reduction of congenital dislocation of the hip is indicated when (1) closed reduction cannot be achieved by an experienced surgeon within half an hour; (2) the head is displaced too far outwards, or where redislocation occurs readily on manipulation without a marked slip of the head of the femur; and (3) redislocation occurs during plaster fixation or subsequently, provided that technical errors have

been avoided. The normal angle of anteversion is about 20 degrees and a corresponding amount of medial rotation is therefore appropriate, but when anteversion is very marked, fixation in 60 to 90 degrees of medial rotation may be required.

If rotation osteotomy is indicated after open reduction, it should be performed 4 to 8 weeks later. After complete fixation in plaster for 8 weeks, the child is placed in a moulded plaster bed, and movements and massage are started. The technique used by the author is to divide the femur with a saw just below the lesser trochanter, and rotate the lower fragment outwards 60 to 80 degrees, as required, the position being maintained by means of a Lane plate. Rotation osteotomy has been performed four times after open reduction with two satisfactory results. One poor result was due to the screw losing its hold in the porotic bone and allowing the lower fragment then to rotate back into its original position. There were 10 cases of marked anteversion in which no operation was performed. In 5 cases the result was good; in 5 it was poor and these patients would, no doubt, have been benefited by osteotomy.

During the period from 1935 to 1947, open reduction of 50 hip joints was performed in 44 patients, 38 of them girls, and 6 boys. Their average age was 2 years and 9 months, actual ages varying from 13 months to 5 years. The frequency with which various structures prevented reduction was as follows: isthmus, 21 cases; ligamentum teres, 5 cases; isthmus and ligamentum teres, 4 cases; superior capsular fold, 3 cases; inferior capsular fold, 10 cases; capsular fold and ligamentum teres, 3 cases; acetabular connective tissue, 4 cases. In some cases the head of the femur seemed to be too large for the acetabulum.

The results at the time of discharge from the hospital, both clinical and radiologically, were good in 41 instances but the late results (5 to 13 years after operation) were not so satisfactory. A shelf operation was performed in 12 cases. In 5 of these, the procedure was carried out simultaneously with the open reduction, with good results in 4; in another 5 cases, in 6 weeks to 2½ years after the open reduction, with only 1 good result; and in 2 cases, a shelf operation performed after closed reduction subsequently proved unsatisfactory, open reduction being required 4 months and 1½ years later, respectively. The chief indication for the operation is a disproportionately large femoral head. The author considers that it should be employed more frequently than it has been in the past.

C. Fred Goeringer, M.D.

**Daily Muscle Physiological Problems, with the Practical Example of the Internal Knee Derangement** (Muskelphysiologische Probleme im orthopaedischen Alltag an Hand des praktischen Beispiels der Binnenverletzung des Kniegelenkes). M. Dubois. *Zschr. Orthop.*, 1950, 79: 244.

In view of the fact that meniscus operations result in the loss of muscle tone and volume, the author discusses the anatomy and junction of the medial meniscus. He defines the meniscus as a horizontal capsular re-enforcement with lubricating properties and a capsular tension spring. Fixation of the knee in extension predisposes to hypotonia and atrophy. There is ligamentous tone present. Decreased local muscle tone affects the general postural tone, which can be strengthened by psychomotor stimuli (gymnastics and early ambulation). The muscle atrophy is not only an inactivity atrophy but is concerned with circulatory changes, autonomic regulation, and sensory stimuli.

The principles of therapy are fixation in midposition, early graded strong resistance, and exercises with long intermissions and avoidance of knee effusion.

Ernest H. Bettmann, M.D.

**The Treatment of Complications Following Injuries of the Instep** (Le traitement des séquelles des traumatismes du cou-de-pied). Cl. Van de Voorde, A. De Wulf, and E. Vereecken. *Acta orthop. belg.*, 1950, 16: 119.

The author reports on the treatment of 514 sprains of the foot with the following complications: Sudeck's atrophy (2.3 per cent), diffuse edema (3.7 per cent), and limitation of function (1.3 per cent). Among 80 cases of unilateral malleolar fractures there were 67 good results; among 79 bimalleolar fractures there were 61 good results; and among 66 comminuted fractures there were 37 good results.

In the discussion, anatomical and physiological principles are emphasized. The role of gravity in the postoperative course and the physiology of the ankle are discussed in detail, as well as the function of the muscles and their action upon the foot. The transmission of weight-bearing forces are very carefully considered with the help of diagrams and photographs. Hypermobility of the ankle is also discussed in detail.

One chapter of this discussion is devoted to the technique of taking roentgenograms and it is suggested that routine anteroposterior and lateral views be taken with the foot in inversion, eversion, external rotation, and internal rotation as well as a view of the distal end of the tibiofibular joint. Arthrography may be necessary to establish the diagnosis.

The treatment of these conditions is discussed. Physical therapy consisting of hydrotherapy, electrotherapy, massage, thermotherapy, and the use of the Unna boot is mentioned. In the treatment of Sudeck's atrophy, Boehler uses the skin type of cast and allows the patient to walk with sedation for the elimination of pain. Hohmann treats the acute cases by immobilization with removable plaster, allowing active and passive exercises. Other authors use other types of physical therapy for the treatment of this condition. X-ray therapy is used by some in order to diminish the decalcification. Injection of calcium, phosphorus, ovarian hormones, thyroid and parathyroid extracts, or vitamins is also done.

Leriche introduced the injection of acetylcholine preparation, known as trihebdomadaires, 0.1 gm.

in the form of 12 daily injections. This treatment is comparable with sympathectomy. Some authors use local infiltration of procaine or other medication. The last treatment is used very rarely at the present time. Other authors use paravertebral anesthesia.

In cases of loose ligaments, elastic bandages and heel lifts are used. In cases of traumatic flat feet, re-education of the muscles, elastic immobilization, and physical therapy are used. The traumatic spastic flat foot is treated by massage and zinc bandage.

In the last chapter of this summary the surgical approaches of the foot are discussed, a small chapter at the end being devoted to tendon repair and skin grafts. Other surgical procedures, such as open reduction, astragalectomy, and fusion operations, are mentioned. The correction of valgus and varus deformity is accomplished by wedge osteotomy, and fusion of the ankle joint by the insertion of multiple pins through the plantar surface into the tibia. American, English, and French literature has been used as a source for compiling many interesting facts.

GEORGE I. REISS, M.D.

**Treatment of Painful Amputation Stumps.** W. RITCHIE RUSSELL and J. M. K. SPALDING. *Brit. M. J.*, 1950, 2: 68.

On the basis that conduction in a mixed nerve is abolished by repeated pressure and that regenerating nerve fibers in a neuroma following an amputation are even more vulnerable to trauma than normal nerve endings, the authors have conceived and enacted the plan of treating causalgia by hammering the neuroma, with some remarkable degree of success. It is conceived that when a painful neuroma is repeatedly hammered, the nerve endings degenerate and are replaced by fibrous tissue; hence cessation of phantom limb and painful stump syndromes. The symptoms are painful stump, phantom limb, paresthesia, and a feeling of intentional avulsion of a digit or toe nail. Attacks occur, by and large, from 1 year to 16 years after amputation. The duration of a seizure may be from a few minutes to a few hours or days.

The authors first treated 7 patients and attained excellent results. At no time did the amputee become resistant to the percussion treatment as outlined by them. Having evaluated the efficacy of the hammering treatment of neuroma in 7 cases, an additional 37 patients, from an unselected group of amputees, were treated. Results obtained in the latter group were not uniformly good. In 33 of the 37 cases excellently profiled, 11 achieved excellent results, 8 good, 5 improved, and 9 unchanged.

Treatment consists of a special applicator suitable either for thigh or arm amputation stump, and a wooden mallet. The impact of the trauma is directed immediately over the neuroma. Incipiently, the amputee is treated 2 to 3 times daily; then at longer intervals until cessation of symptoms is achieved.

SAMUEL L. GOVERNALE, M.D.

# SURGERY OF THE BLOOD AND LYMPH SYSTEMS

## BLOOD VESSELS

**Evaluation of the Severity of Organic Occlusive Disease and Comparison of the Effectiveness of Various Procedures in Relaxing Peripheral Vasospasm. Severity Evaluated by Determining Cutaneous Blood Flow in the Extremities from Records of Cutaneous Temperature during Maximum Vasodilatation, Effectiveness of Spinal Anesthesia, Intravenous Tetraethyl Ammonium Ion (Etamon), Intravenous Benzylimidazoline (Priscoline), and Application of Heat to Torso.** HAROLD D. GREEN, WILLIAM PERKINS, and JOSEPH ABERNETHY. *Circulation*, 1950, 1: 1277.

The maximum circulation possible in patients with peripheral vascular disease is compared with the maximal flow in normal persons after all vasospasm is abolished in each instance. The methods used for relaxing vasospasm are the application of heat to the torso, of tetraethyl ammonium chloride (etamon), and of benzylimidazoline (priscoline), each alone and in combination with warming of the torso, and spinal anesthesia. The vasospasm is relaxed by the above method after first cooling the body for 1 hour at about 20 degrees C., which brings about a moderate vasoconstriction. The cutaneous blood flow was estimated from formulas by determining skin, room, and body temperatures. The cutaneous temperatures were taken with an 8 point Leeds and Northrup micromax, iron constantin thermocouples being attached to the skin with a drop of collodion. The room temperature was maintained between 19 and 20 degrees C., and the air was constantly in circulation; the relative humidity was maintained at 50 per cent.

In equilibrium, the rate of delivery of heat to the skin is equal to the rate of loss of heat from the skin, the rate of transfer of heat from the subcutaneous tissue to the skin, and the rate of delivery of heat by the blood to the subcutaneous tissue. The heat delivered is the difference in temperature between the arterial and venous blood (heat capacity) times the cubic centimeters per minute blood flow. Since actual values are impractical, a relative blood flow estimation may be made from time to time in the same subject under constant conditions. The relative difference is called the thermal circulation index and represents the relationship between the cutaneous temperatures and the blood flow. In using formulas to show these relationships, it appears that a 1 degree rise at high skin temperature range (35° to 36°) indicates a very marked increase in the blood flow, whereas at low skin temperature range (21° to 22°) a small increase in blood flow is indicated. The differences in temperature obtained in this study translated into terms of thermal circulation index indicate greater changes than ordinarily realized.

After exposure to cool environment the surface temperatures, as usual, are coolest in the most peripheral parts of the extremities. After the intravenous administration of etamon for 30 minutes, 20 mgm./kgm. in 250 c.c. of saline solution, the cutaneous temperatures in normal subjects were consistently increased throughout except for the forehead—the foot and toes to 32.4° to 33.8°. The thermal circulation index averaged 4.39° increase. Priscoline, given similarly in doses of 200 mgm. intramuscularly, or 2 mgm./kgm. per body weight intravenously resulted in some warming, but the average increase of the thermal circulation index was only 1.91°.

The effect of body warming with blankets and heat pads to the torso and any part of the extremities not being used for temperature studies on the surface temperature was determined alone and together with the use of etamon or priscoline. The thermal circulation indices increased an average of from 1.00° to 1.68° with heat alone, and in combination with etamon an average of 4.82°, and in combination with priscoline, 4.78°. Spinal anesthesia alone was also tested and caused a rise in the index to an average of 2.81°.

These rises in skin temperatures in normal patients are produced by large increases in blood flow. However, as indicated through formulas, if the maximum possible circulation is small, as occurs in patients with peripheral arterial insufficiency, then small changes in blood flow will produce considerable alteration in the skin temperatures.

Three patients with arterial insufficiency were studied by measuring the temperatures of the first and fifth toes in response to the same methods under similar conditions except that the one-hour period of cooling the entire body was omitted. Very small temperature rises were charted, and the thermal circulation indices in these individuals usually ranged far below 1.0°. DAVID MOVITZ, M.D.

**Construction and Mechanics of Aortic Wall with Consideration of the Surgical Treatment of Isthmus Stenosis** (Bau und Mechanik der Aortenwand unter Beruecksichtigung der operativen Behandlung der Isthmusstenose). A. BENNINGHOFF. *Chirurg*, 1950, 5: 276.

The aorta is the central distributor of the blood and elastic elements predominate in the construction of its wall, where they are in part arranged into lamellas which show multiple anastomoses. The short and slender lamellas may be compared with the separations of a rubber sponge which is stretched and whose round pores are thereby changed into slits. This elastic framework is permeated by elastic fibers which form a continuous whole, condense into lamellas, but also spread into the interstices. These fiber systems run principally in spiral tracts which cross one another and surround the tube. The gradient of the spiral fibers is smallest near the intima (about 25 degrees) and becomes greater in the outer

layers of the media (30 to 50 degrees). Thus, the spiral tracts become steeper as they become more external and this results in a torsion structure. The circular and the longitudinal stresses in the aorta are not taken up by separate circular and longitudinal or oblique fiber layers as in arteries of the muscular type, in which the media takes up the circular stresses and the intima and adventitia take up the longitudinal stresses. The aortic structure is consequently favorable for vascular suture. The adventitia of the aorta consists only of loose connective tissue and has no mechanical significance.

If the aorta had only elastic elements, it would be comparable mechanically to a rubber tube, but conditions are changed by the presence of small branching muscle fibers, the endings of which are inserted on the elastic framework. These muscles do not produce any worthwhile transverse changes, but are capable of increasing or decreasing the elastic expansion resistance of the aortic wall. Therefore, the author has called them tension muscles. The elasticity of the aorta can thereby be regulated through the sympathetic nervous system.

The aortic wall shows differences in structure at sites of special stress. From the three points where the semilunar valves meet, the fibers in the intima and media radiate in the form of tension lines because of the pressure to which the valves are subjected during systole. In addition, there is in the intima a more longitudinally directed fiber tract which starts at the aortic root, runs along the right border of the ascending aorta, and passes over the apex of the aortic arch to end in the posterior wall of the descending aorta between the origins of the intercostal arteries. Additional longitudinal fibers in the media take the same route. The aortic wall is also in general somewhat thicker on its external convex side than on the concave side.

In vascular suture after removal of an isthmus stenosis, there is a critical point on the left side of the aorta where the longitudinal stresses resulting from the pulsations are, according to Timm's findings, somewhat higher than on the right side. Judging from the anatomic findings, the posterior wall should also receive special attention because of the presence of the longitudinal fiber systems. As a result of differences in growth between the aorta and its substrate, the former is stretched longitudinally. The consequent tension in young children is still small because the vessel is extensible. Suture is more easily performed in children than in adults. To avoid stress after the operation a slightly bent posture is recommended. RICHARD KEMEL, M.D.

**Discussion of 2 Cases of Thrombosis of the Internal Carotid Artery, with Angiographic Findings** (Considerazioni su due casi di trombosi della carotide interna con reperto angiografico). M. QUARTI and F. COLUMELLA. *Chirurgia*, 1949, 4: 343.

Two cases of thrombosis of the internal carotid artery are reported by the authors. In the first patient, a man of 40 years, the condition was of infectious origin, following a tonsillar abscess; in the other patient, a man of 45 years, the thrombosis developed after trauma, namely, a fall from a bicycle. Percutaneous arteriography established the correct diagnosis in both cases and allowed the exclusion of suppurative encephalitis in the first patient.

Cervical sympathectomy produced a marked improvement in the clinical symptomatology of both patients.

Three types of thrombosis of the internal carotid artery may be distinguished: posttraumatic, toxinfectious, and endarteritic.

JOSEPH K. NARAT, M.D.

**External Iliac Artery Thrombosis.** A. M. BOYD and R. P. JEPSON. *Brit. M.J.*, 1950, 1: 1457.

Two cases of thrombosis of the external iliac artery are reported by the authors in detail. The presenting symptom in both of the cases was intermittent claudication. During exercise the patients noted vague discomfort in the calf and thigh followed by typical claudication pain relieved by short rest. The degree of claudication depended upon the balance between the blood supply and the demand and became much less severe as the collateral circulation developed. The arterial pulses of the limbs were diminished but not to the same degree in the 2 patients. Upon exercising, the arterial pulses of the affected limb disappeared completely in Case 1 and almost completely in Case 2.

Oscillometric readings taken while the patients were resting were much reduced, and after the patients had walked a sufficient distance to produce the claudication pain it was found that the oscillometric readings were increased for the normal leg and still further reduced for the painful leg. The foot on the painful side also became paler. This reduction in oscillometric readings after exercise is described as an inverse reaction and is an important diagnostic feature along with the disappearance or marked diminution of pulses after exercise followed by a rapid return to normal on resting.

Other investigations revealed no significant changes, such as in the temperature, electrical skin-resistance readings, and straight roentgenograms of the abdomen, and the pelvis and limbs revealed no vascular calcification; the clotting time and platelet counts were also within normal limits.

The possible causes of arterial thrombosis were discussed:

1. Arterial disease: segmental thrombosis of a main vessel in young men is generally regarded as due to thromboangiitis obliterans. In older subjects thrombosis of a main vessel is a frequent complication of arteriosclerosis.

2. Idiopathic thrombosis: no etiological factor is usually found in these cases; however, in addition to the thrombosis in the limb vessels there is usually a more widespread arterial thrombosis in the cerebral, renal, and coronary vessels; a deep or superficial venous thrombosis is often also found. This

type of arterial thrombosis has been described as a localized arterial thrombosis of indeterminate origin.

3. Trauma: arterial thrombosis is often seen in healthy arteries after severe injury, such as run-over accidents or instances in which heavy objects fall across a limb. The accompanying vein is usually thrombosed and fractures are common. The most common cause of arterial damage resulting in thrombosis is indirect trauma. The site is close to a joint or between bone and a tendinous insertion of a muscle, for example, the popliteal artery as it enters the popliteal tunnel at the level of the upper border of the femoral condyle, or the subclavian artery as it lies on the first rib against the tendon of the scalenus anticus. The pathology of the lesion is not clear, but contusion of the arterial wall causes rupture of the vasa vasorum and an intramural hematoma is a possibility. A similar lesion or an intimal tear may be due to a "stretch-strain" or the result of traction on a muscular branch (arterial).

The popliteal artery is the most common site of thrombosis due to indirect trauma. Arteriograms will often reveal the level of the thrombotic lesion.

In Case 1, the condition was due to direct trauma as the result of the patient's being struck across the lower part of the abdomen and thigh by a tree, and in the second case it was due to indirect trauma caused by stretch-strain from repeated flexion of the hip joint as the result of cycling.

The treatment followed in the cases presented was segmental resection of the thrombosed external iliac artery. This was done primarily for histological verification but there was no reason to believe that removal of the thrombotic zone would discourage further spread. However, Leriche has suggested that the thrombosed artery initiates reflex vasospasm and this is the reason for its being excised.

A lumbar sympathectomy is done along with the resection of the thrombosed artery, which denervates not only the vascular bed of the limb but also the main collateral vessels. It is suggested that the incision made for the lumbar sympathetic chain be made as small as possible in order to avoid excessive damage to the collateral vessels. The lumbar chain from L1 to L3 is usually removed, and only by removal of L1 ganglion can the necessary high thigh denervation be obtained.

In Case 1, the operative procedure was performed approximately 1 year after the injury, and in Case 2, about 5 years after the injury; thus sufficient time had elapsed for adequate collateral circulation to be established. The prognosis in both cases was excellent. Postoperatively, exercise caused the limb pulses to become palpably stronger, whereas preoperatively the converse had been observed. However, the long term result could not be predicted, since with increasing age the effect of arteriosclerosis could be more severe in a leg in which the circulation has already been impaired by the occlusion of the main artery. Subjectively, both patients had considered their condition to be much improved.

JOHN E. KARABIN, M.D.

**Surgery of the Innominate Artery, with Special Reference to Aneurysm.** SIR GORDON GORDON-TAYLOR. *Brit. J. Surg.*, 1950, 37: 377.

In presenting a collected series of cases involving surgery of the innominate artery the author has availed himself of every known source. He records the first surgical attempt to ligate proximally to a subclavian aneurysm in 1818 and all subsequent cases he could collect. Since then there have been 133 recorded attempts to ligate the innominate artery. The mortality rate in these cases over the years has been about 50 per cent. In a burst of nationalistic pride he indicates that a majority of the procedures have been done by surgeons of the British Commonwealth. The author has included 22 unpublished cases in the series and indicates he has performed the operation on 7 occasions.

The cases are divided into 2 groups. The first consists of 52 cases of ligation, or attempted ligation, of the innominate artery for innominate aneurysm. The 10 cases seen up to 1907 terminated fatally as a result of surgery. Among the 42 cases observed since then there were 13 deaths. The second group consisted of 81 cases of ligation, or attempted ligation, of the innominate artery for subclavian aneurysm or secondary hemorrhage. Of the 48 cases seen up to 1907, 34 terminated fatally as a result of surgery. Among the 33 cases observed since then there were 9 deaths. These cases are all well summarized in tables. In addition there are many case reports describing the pathology and operative approach. Although trauma seemed to be a factor in the etiology of aneurysm, the majority of the cases appeared to be spontaneous in origin. With 2 exceptions all of the cases occurred in people over 20 years of age. ROBERT L. CRAIG, M.D.

**Venous Pressure in Varicose Veins in Patients with Incompetent Communicating Veins. A Study of the Statics and Dynamics of the Venous System of the Lower Extremity under Pathological Conditions.** H. STÜRUP and I. C. HØJENSGARD. *Acta chir. scand.*, 1950, 99: 518.

The authors examined the pressure in varicose veins of patients with incompetent communicating veins in the standing position, while marking time, and during coughing and straining (raised intra-abdominal pressure?). The pressure readings were made both without compression of the varicose veins and with proximal compression of the possibly incompetent saphenous vein, and finally during an attempt to compress the incompetent communicative veins. These studies were made of 6 patients with primary varicose veins and of 6 patients with postthrombotic varicose veins in an attempt to elucidate the significance of the communicating veins and their competence as regards the formation of varicosities and their treatment.

Incompetence of the communicating veins was diagnosed by means of the Trendelenburg test, that is, filling of the varicose veins in less than from 20 to 30 seconds in the standing position after previous

emptying of the varicosities through elevation and successive compression of the incompetent saphenous vein. In this series the incompetent vessels were found in the "lower leg," mostly in the distal half.

The authors' findings were that the pressure in the subcutaneous veins was not influenced by the incompetent communicating veins in the standing position or during walking. Coughing and straining seemed to produce a considerable transmission of pressure via the deep veins through the incompetent communicating veins to the subcutaneous veins. It was concluded that "incompetent communicating veins in the thigh are presumably of much greater moment than incompetent communicating veins in the lower leg." LEROY J. KLEINSASSER, M.D.

**Venous Pressure in the Deep Veins of the Lower Extremity of Patients with Primary and Postthrombotic Varicose Veins. A Study of the Statics and Dynamics of the Venous System of the Lower Extremity under Pathologic Conditions.** H. STÜRUP and I. C. HØJENSGARD. *Acta chir., scand.*, 1950, 99: 526.

The venous pressure in the popliteal vein was studied in 9 patients with primary subcutaneous varicosities and in 5 patients with postthrombotic subcutaneous varicosities and recanalized deep veins. The differential diagnosis was on the basis of clinical history and, in cases of doubt, phlebography. The pressures were recorded by either direct puncture, in which event the examination was limited, or by catheterization through the external saphenous vein.

Venous pressures were recorded in the standing position, during walking, and during straining and coughing (raised intra-abdominal pressure?). In the standing position the pressure was found to be equal to the calculated hydrostatic pressure, and during walking the mean pressure remained practically unaltered in both groups. It would seem that the postulate that the venous pressure in the deep recanalized veins of postthrombotic patients is abnormally high, or that this pressure rose during action, is incorrect.

Coughing and straining produced an increase of pressure in the popliteal vein of about 50 cm. of water in patients with primary varicosities, but of only about 20 cm. in postthrombotic patients. They do not agree with Bauer that the reactions of pressure in the popliteal vein might be due to incompetence of the femoral vein. They feel that the marked elevation of pressure, even in valved, probably deep veins, on coughing and straining, would seem to support the contention that heavy body work is important in the development of primary varicosities. LEROY J. KLEINSASSER, M.D.

**Undecided Questions of Vascular Surgery** (Unentschiedene Fragen der Gefaesschirurgie). H. GESENIUS. *Chirurg*, 1950, 5: 284.

In a previous report on 1,400 vascular injuries, several questions were left unanswered; the author now attends to these.

His statistics show that percutaneous arteriography was more successful than arteriography after exposure of the vessel. However, numerous percutaneous arteriographies were performed in clinics where the method had been cultivated, while operative arteriography was often attempted in small hospitals without particular knowledge of the technique. Thus, arteriography must be learned in order to succeed.

Theoretically, the superiority of suture over ligation of the injured vessel is admitted, but in practice the suitability of suture badly needs the proof of subsequent permeability. Among 1,110 injuries that could be sutured, 196 were sutured and 502 were ligated, a ratio of 1 to 2.6. Unfortunately, the concept of Bier and some others that a certain tension in circular vascular suture does no harm is still widespread. In such cases disappearance of the pulse on stretching of the extremity has been observed.

In a femoral arteriovenous fistula below the origin of the profunda, the surgeon had simply ligated the bridge between the two vessels. Oscillography showed good pulsations and arteriography confirmed the excellent result of the operation.

The question whether ligated but unsectioned vessels can again become permeable is answered by 2 cases in which this apparently happened. The experiences of gynecologists show that the kind of suture material used (catgut, silk, or cotton) does not play an important part.

Vein implantation according to Lexer was tried 9 times: in 1 axillary, 3 femoral, and 5 brachial arteries. It succeeded twice.

Thrill was found to be a characteristic of arteriovenous aneurysm. When Stitch states that arteriovenous aneurysm with its phenomena does not always appear immediately in connection with the injury, it should be remembered that aneurysms and arteriovenous fistulas practically never reached the clinic before the third day following the injury.

In patients with vascular injury there was not only a visible hyperemia but also a measurable pulse increase following the operation. This may have been erroneously accepted as denoting successful vascular suture by many surgeons. When the author observed this for the first time during oscillographic control after vascular suture, he was surprised: the oscillations began on the side operated on earlier than on the healthy one.

Nearly all surgeons think that aneurysms must be operated upon sooner or later. The disagreement is as to which form of aneurysm needs surgery more urgently. Few surgeons have wondered whether, in view of the high mortality after operations on the large vessels, it would not be possible to do without intervention, and still fewer have tried to find this out. In the series there were 3 cases in which a planned but dangerous operation was given up. In the statistics after the first World War there are 22 reports of patients with arterial or arteriovenous aneurysm, of whom two-thirds were operated upon more than

15 years after injury. However, there are no reports on patients who were not operated upon. The author saw 4 men with aneurysm who were living practically without disturbances for from 15 to 30 years. RICHARD KEMEL, M.D.

## BLOOD; TRANSFUSION

**Observations on Recent Discoveries Connected with the Blood Groups Rh ($C^w$ and $D^u$), M-N (S), Lewis (Le), Together with the Rh and M-N Types and Agglutinogen P in White Australians.** R. T. SIMMONS and J. J. GRAYDON. *Med. J. Australia*, 1950, 1: 681.

The authors discuss the Rh factor in blood work, as well as some of the recent work concerning the Rh variants $C^w$ and $D^u$, the S subdivision of the M-N types, and the Lewis (Le) blood group in white Australians.

In 300 random blood samples the Rh antigen $C^w$ was found to occur 5 times (1.66%). This is a lower occurrence rate than that found in England, Latvia, Norway, or Holland. Of 19 samples of anti-D agglutinating sera, 10 were anti-D+$D^u$, and 9 were anti-D. Of 220 random blood samples, 48.2 per cent showed positive reactions when treated with anti-S serum. In a series of 128 blood samples 70 per cent were shown to be P-positive. This percentage is lower than that of the Mexican Indians, white Americans, and negroes in New York. Preliminary data indicate the absence of $C^w$, $D^u$, S, and $M_2$, and a high percentage of P in Australian aborigines.

ELY ELLIOTT LAZARUS, M.D.

**The Thrombogenic Property of Foam of a Synthetic Anionic Detergent (Sodium Tetradecyl Sulfate N.N.R.).** EGMONT J. ORBACH and A. KENNETH PETRETTI. *Angiology*, 1950, 1: 237.

Clinical and experimental results with sodium tetradecyl sulfate (S.T.S.) indicate that it is much more effective than the soap solutions as a sclerosing agent. To improve the thrombogenic activity of the agent the authors inject the S.T.S. in the form of foam following an intravenous air block, produced by the injection of a small quantity of air preceding the injection of the sclerosing agent. This enables the S.T.S. to act upon the intima undiluted. This increases the thrombogenic activity.

The method used is to take 0.1 c.c. of a 3 per cent S.T.S. solution and to shake it into a foam. About 0.5 c.c. of air is drawn into the syringe and first the air and then the foam is injected into the vein, the solution being retained.

Experimental results on mice indicate that the S.T.S. foam has 3.5 to 4 times the thrombogenic property of the solution in terms of weight of the material employed.

The average dose clinically used was 0.3 c.c. although the amount varied according to the size of the vein, but not more than 0.5 c.c. was given. There was not a case of severe periphlebitis slough, local or generalized sensitization. Satisfactory sclerosis was obtained in 91.3 per cent of the varicosities injected.

The surface action of S.T.S. is fast, as the S.T.S. combines with the solid elements of the cell wall and destroys its structure. The results are irreversible. The disadvantages of surface active agents are that they react with cellular elements of the blood as well as with those of the intima which results in hemolysis, the production of tissue debris, and probably the liberation of histaminelike substances, which is responsible for the majority of the anaphylactic systemic side reactions. These disadvantages can be eliminated by proper dosage and the prevention of the dilution of the agent with blood. This is what the empty vein technique and air block method attempt to achieve. When the foam is used only a film is deposited on the vein wall and most of the material in the lumen is air.

JACOB T. BRADSHER, JR., M.D.

**The Meaning and Value of the Biologic Test in Blood Transfusion** (Der Sinn und Wert der biologischen Probe bei der Bluttransfusion). F. OEHLECKER. *Chirurg*, 1950, 5: 261.

The author deplores the fact that some instructions for blood transfusion contain erroneous statements, such as that the biologic test should be used to recognize unknown possibilities of damage, when in reality this test has nothing to do with vague, unknown damage but shows with absolute certainty the well known, important, and feared injury "hemolysis" (hemoglobinemia) which occurs when the blood groups are incompatible in a transfusion. He demonstrated long ago that compatibility and incompatibility of the blood groups can be recognized in the beginning of a transfusion by a properly executed biologic test. Since the hemolysis appears in from 1 to 2 minutes, it is appropriate to designate the clinically very striking symptoms as immediate reaction, in opposition to the secondary reaction which appears from one-half to 2 hours after the transfusion. The demonstrated, unconditional reliability of the biologic test makes it advisable to use it as an ultimate security measure in every transfusion, particularly since it means only a very short interruption of the transfusion. When correctly understood and properly performed, this test reveals any error that may have occurred in the preliminary serologic examination; several times it has avoided an accident by showing an immediate reaction when a mistake was made between two donors or two containers of fresh blood, or when inappropriate conserved blood was used.

The biologic test is best performed in the following manner. In the beginning of the transfusion from 10 to 20 c.c. of donor's blood are injected as fast as possible (less in very weak patients). The subject is then carefully observed for 2 minutes. If his behavior does not change, the blood groups are compatible. However, when after a minute there are shocklike phenomena, such as unrest, oppression, and pulse alteration, hemolysis is present. These

phenomena usually disappear soon, but this should not deceive the physician and make him think that they were due to excessive anxiety or nervousness of the patient. If there is any doubt about their meaning, a second but larger test dose of blood (30, 40, or 50 c.c.) should be injected rapidly or allowed to run in and the patient again observed for 2 minutes. Any uncertain shock phenomena that have appeared at the first test will then reappear immediately to an increased degree. Any physician who has not seen how hemoglobinemia behaves in man should proceed cautiously and after test doses should ask the patient how he feels.

The test is particularly valuable in urgent cases in which the preliminary tests could not be executed carefully enough.

The biologic test naturally loses its value when a transfusion must be done in a patient who is under the influence of narcosis or oppression. The usefulness of the method is also restricted when lumbar or peridural anesthesia must be performed. In these cases the direct preliminary serologic test must be used before transfusion, or a donor of group O should be provided. RICHARD KEMEL, M.D.

**Nine Blood-Group Antibodies in a Single Serum After Multiple Transfusions.** J. O. COLLINS, RUTH SANGER, F. H. ALLEN, and R. R. RACE. *Brit. M. J.*, 1950, 1: 1297.

Studies were made of the antibodies in the serum of a 57 year old woman who had received 20 blood transfusions during the 12 years preceding this report. The primary disease was osteosclerosis with extramedullary hematopoiesis. Of unusual interest was the occurrence of 9 blood-group antibodies in the patient's serum. Five of the antibodies were rare ones (anti-$C^w$, anti-S, anti-K, anti-N, and anti-$Le^b$). The authors are uncertain whether the appearance of the numerous antibodies is a common phenomenon after multiple transfusions, or whether ability to make so many blood-group antibodies is rare, perhaps secondary to this patient's disease (osteosclerosis). LEONARD D. ROSENMAN, M.D.

**Multiple Antibody Response to Repeated Transfusions.** R. H. MALONE and J. COWEN. *Brit. M. J.*, 1950, 1: 1299.

A case history of a 64 year old woman with acquired hemolytic anemia is presented. The case illustrates an heretofore little considered risk of multiple transfusions. In an undetermined proportion of recipients rare antibodies will appear in the blood. These antibodies cannot be detected by routine methods of cross-matching.

This patient had Group A Rh positive red cells. She received transfusions of packed red cells from 24 different donors during the month preceding her death. The donors' bloods were compatible with the blood of the patient in routine cross-matching for A, B, O, and D antigens, but the patient developed rare anti-E, anti-M, and anti-P antibodies which could not be detected by routine methods.

Therefore, it is recommended that careful testing for the rarer antibodies be performed in patients receiving many transfusions.

LEONARD D. ROSENMAN, M.D.

# SURGICAL TECHNIQUE

## OPERATIVE SURGERY AND TECHNIQUE POSTOPERATIVE TREATMENT

**Operative and Postoperative Complications.** FRANK H. LAHEY. *Surg. Clin. N. America*, 1950, 30: 785.

Personal experiences with operative and postoperative complications are discussed by the author.

Sensitive carotid sinus reflex is a complication often incurred in operations upon the neck. This reflex has been produced by unavoidable retraction which causes pressure upon a sensitive carotid sinus. There have been no cases in the author's experience in which the patient did not recover without complications, although the literature has reported cerebral accidents and fatalities in these cases. In every instance the pulsation in the large vessels returned within a half minute to a minute. If the pulsation does not return within this time, one should be extremely suspicious that the condition is not a carotid reflex but cardiac arrest.

A simple method of distinguishing between a carotid sinus reflex and cardiac arrest is suggested and involves the introduction of a needle through the fourth interspace into the wall of the ventricle to demonstrate by the flick of the ferrule on the needle whether there is any heart action. As soon as the flick is demonstrated one can safely conclude that the condition is not cardiac but a sensitive carotid sinus reflex.

The treatment of sensitive carotid sinuses consists of the infiltration of 1 per cent procaine. The hypodermic needle should be introduced with its beveled edge down so that it penetrates only the adventitia of the vessel. A single injection will diffuse between the coats of the carotid upward and downward and surround the sinus posteriorly. Less than 10 c.c. of procaine is often necessary. The intravenous use of atropine in 1/100 gr. doses has been practiced. The head of the patient is placed in a low position by using the Trendelenburg position.

Bleeding from the internal jugular vein may occur in any neck surgery and an example was cited in a case of esophageal diverticulum in the second stage of its treatment. If one encounters a tear of the internal jugular vein in a granulating field, it is best to approach the vein through a clean incision preferably behind the sternomastoid and demonstrating the intact portion of the internal jugular vein above and below the field where the tear and granulation tissue is present, and ligate in continuity. In cases in which the internal jugular vein is torn deeply into the thorax it is better to pack into the mediastinum to control bleeding by pressure. The internal jugular vein in the midportion of the neck can then be cut between two clamps and twisted down until the twist runs by the opening in the vein in the mediastinum, which controls the bleeding and makes it possible to suck out the blood from the mediastinum. This bleeding often occurs from a branch of the inferior thyroid vein which is torn during the removal of an intrathoracic goiter or an intrathoracic sac of a large esophageal diverticulum.

A procedure similar to the one just described may be used to control bleeding in the angle of the jaw.

Injuries of the thoracic duct may occur. One should never complete neck dissections that involve the removal of structures below the level of the clavicle without wide exposure of the region of the thoracic duct and inspection with a concentrated light for the possible escape of chylous material. If the duct is injured one may clamp it and ligate it to avoid distressing chylous discharges.

Injuries to the pleural apex occur especially if there is an inflammatory reaction of an intrathoracic adenoma or esophageal diverticulum that adheres to the apex of the pleura. If any difficulty with breathing occurs at the time of extraction of tumors in the mediastinum, one should be suspicious that the pleura was opened on that side. It is best to pack the opening in the pleura until the operation is completed, and with the bleeding more controlled the pleura is accurately closed. It is an advantage to introduce an intrapleural catheter into the third or fourth interspace in order to be able to expand the lung on that side as soon as the wound is closed. This catheter is usually removed in 2 or 3 days.

Arterial hemorrhage in neck surgery can be readily controlled with proper exposure and good light. In thyroid surgery the control of the superior and inferior thyroid arteries in all but a few cases will result in control of the arterial bleeding.

Arterial hemorrhage during surgery of the abdomen is a different problem and when it occurs in dealing with a stricture of the bile duct, which particularly interests the author, there is bleeding from the cystic artery and from the right branch of the hepatic artery. One may control the bleeding in this region by inserting a finger in the foramen of Winslow and closing the thumb over the hepatic artery, which permits demonstration of the bleeding point. In the control of arterial bleeding related to traumatic rupture of the spleen or kidney, it is important that the adjacent structures are not included in an ill-advised clamp. As, for example, in injuries of the right kidney the duodenum runs over the hilum of the kidney and could be included in a clamp.

In connection with intra-abdominal bleeding during splenectomies one can always ligate the splenic artery at its origin through the gastrohepatic omentum. Another distressing type of intra-abdominal bleeding occurs from the sacral veins in the removal of large cancers of the rectum. When venous oozing occurs from the sacral veins during the abdominal portion of the operation, it is wise to place a wet pack over them and then to continue the dissection

and to handle them from below after the rectum has been reduced beneath the peritoneal fold.

Among the postoperative complications one of the most common and most fatal is hemorrhage.

Hemorrhage after thyroidectomy may occur from 3 sources, the superior thyroid artery, the inferior thyroid artery, or from the veins. The most important vessel is the superior thyroid artery. The author suggested that in postoperative hemorrhage from the superior artery it is wiser to extend the incision straight up the neck to expose the external carotid artery and find the first branch, which is the superior thyroid artery, and tie this branch under direct vision. This will actually control the bleeding. Another problem that arises with postoperative bleeding in thyroidectomized patients is that of tracheal obstruction. Usually tracheotomies have not been done early enough. They should be done at the same level that the skin incision is made and through the ring that corresponds to the level of the skin incision.

Postoperative atelectasis occurs as a patchy, lobular, or a massive affair. The use of immediate suction bronchoscopy is advised and should be used more frequently in any of the types of atelectasis encountered. It is the author's feeling that in patients showing rises in temperature and pulse unexplained otherwise than with accumulations of mucus, an immediate bronchoscopy should be done.

The insertion of indwelling feeding tubes made of a Penrose drain weighed with mercury is much more comfortable than the rigid Levine tube and should be used through the nose postoperatively for comfort to the patient.

Postoperative intestinal obstruction following resection for ulcerative colitis and regional ileitis, subtotal gastrectomy, and operation for all inflammatory lesions is not an infrequent occurrence. It is suggested that once the diagnosis is established, operation should not be delayed. It is also suggested by the author that one must not delay too long after the Miller-Abbott tube has been put in place. If the obstructive symptoms are not completely relieved within a reasonable period of time one should not delay further but should operate upon the obstruction.

The postoperative care of immediate and late complications following ileostomies and colostomies is a problem of great importance. It is imperative that one inspects the end of the ileostomy or colostomy in order to be sure that the bowel is viable. If it is not viable, it is wise to reopen the wound and pull out a vascularized portion of the ileum or colon. It has never been necessary to suture the colon to the peritoneum or to the fascia because of the danger of tearing out such stitches and producing a contamination and a fecal fistula. All colostomies are implanted in the abdominal wall and kept in place until the ileum or colon is adequately adherent to the wound.

Occasionally in late complications of ileostomies and colostomies there will be a narrowing or stricturing of the skin around the ileostomy or colostomy. This type of narrowing is usually due to a keloid type of skin stricture. This may be relieved by excising a "V" of keloid above and below under local anesthesia, which relieves the encircling stricture.

Thromboembolic disease is one of the most common postoperative complications of all surgery. The author in his clinic has dealt with this complication by means of anticoagulant therapy. He employed femoral ligation very rarely and used it in certain conditions in which anticoagulant therapy is contraindicated, such as in hemorrhagic diseases, ulcerative colitis, or when postoperative bleeding is expected, as in the posterior wound of a Miles resection or a prostatic resection. If in such cases a pulmonary embolism is feared, preoperative prophylactic division and ligation of the superficial femoral vein is done. Other instances in which the femoral vein is ligated are in severe liver disease, before a second stage operation when a thrombotic complication of the first stage requires treatment, and in ambulatory phlebothrombosis with pulmonary embolism.

Wound disruption occurs in spite of the improvements in suture material and the use of antibiotics, especially in elderly patients, poorly nourished patients, and in patients operated upon for carcinoma. Any patient that has a discharge of serum from an abdominal wound which cannot be readily explained usually has a wound disruption. The disrupted wound is opened widely and is closed with through-and-through wire sutures of the figure of 8 type, passed through the fascia and muscle, but not through the skin.

Removal of drains in any wound is done only after a satisfactory period of time has elapsed. Usually a period of 8 or 9 days is awaited before the drain is removed. It is only after this period of time that a good patent canal will usually remain open following removal of the drain.

The discussion of these complications is the result of the author's personal experience.

JOHN E. KARABIN, M.D.

**Late Results of AT 10 Therapy in Postoperative Tetany** (Résultat éloigné d'une tétanie post-opératoire traitée par l'AT 10). P. MALGRAS and LEROUX. *Mem. Acad. chir.*, Par., 1950, 76: 432.

A woman 31 years of age with a clear Basedow syndrome failed to respond to iodine therapy over a period of 5 months and was therefore subjected to radical bilateral thyroidectomy; only the right lower parathyroid gland with its pedicle and a very little thyroid tissue were allowed to remain. The remaining portion of the parathyroid gland was then accidentally crushed by the forceps during the operation. During the next few hours the patient developed cyanosis and marked dyspnea, which is quite unusual in such cases. On the following day both hands were contracted with the fingers extended and the thumbs in adduction. This contracture was extremely painful and began about 14

hours after the operation. An injection of 1 c.c. of parathyrone brought no relief, but a half hour after the injection of 2 gm. of calcium chloride intravenously, the symptoms subsided promptly and the patient regained the use of her fingers. In spite of combined injections of parathyrone and calcium every 3 hours, she suffered 2 new attacks in the afternoon and 2 attacks daily for the next 6 days, even when receiving injections morning and night. After 8 days, the number of attacks was reduced to 1 daily; this responded to an injection of 2 gm. of calcium chloride without the parathormone. On the fifteenth day, however, the number of attacks increased again to 2 a day, requiring 4 gm. of calcium every 24 hours.

Since the blood calcium continued to fall, it was decided to try a calcium graft, and a piece of os purum (7.20 gr.) was implanted in the retromammary tissue. The daily attacks persisted, responding only to the intravenous administration of calcium. In addition, the patient began to suffer from a tingling sensation in her arms and legs, with a sense of thoracic oppression and painful respiration. Thirteen days after the operation, it appeared evident that the graft had proved a failure and the veins were in no condition to permit further intravenous therapy. It was decided to try progressively increasing doses of AT 10, as recommended by Bauer, with control of the calcemia and clinical symptoms.

During the first 7 days, the patient received 110 drops of AT 10 and suffered only 2 attacks during the entire period. These responded to calcium injections. During the second period of 7 days, she received 150 drops of AT 10 and had no attacks. Thereafter she was given 150 drops of AT 10 for 3 days in every 7 day period, after which she received 210 drops a week to keep the calcemia at the desired level and prevent subjective symptoms. In the meantime, all of the Basedow symptoms had disappeared, her pulse was 80, she slept well, and had gained 4 kgm.

In an attempt to discontinue the AT 10 therapy, the attacks and symptoms recurred after 10 days. Upon resumption of the AT 10 therapy the blood calcium rose and the attacks disappeared.

Because of the difficulty in procuring AT 10, it was decided to make another attempt at grafting, this time with bone from the patient's own tibia implanted deep into the thigh in contact with the femoral diaphysis, but the results were disappointing. The AT 10 therapy was resumed and all symptoms disappeared and the blood calcium rose to a higher level. After an interruption of the AT 10 treatment of 20 days, due to difficulties in procuring the drug, the attacks recurred and intravenous calcium injections had to be resumed. The patient then began taking AT 10 in doses of 200 drops weekly, regularly, and has since been in a good physical condition, with no signs of Basedow's disease and no psychic disturbances.

The graft operation probably failed to yield results because all traces of parathyroid tissue had been removed, and might have proved more beneficial with an associated implantation of parathyroid tissue.

In the present case, good results were finally achieved by the administration of 200 drops of AT 10 weekly. The dose must be determined for each individual case. The effect is not immediate and the blood calcium increases only after a few days, after which the effect persists for a few days, indicating an accumulation of AT 10 in the body. There seems no way of regulating a maximal increase in the blood calcium. If it exceeds certain limits serious accidents may occur, for which no remedy is known. Therefore the dose should be increased gradually and cautiously. It is not necessary to combine this treatment with the oral administration of calcium. In this case the effects of treatment were studied over a period of 7 years. The treatment had the same efficacy and was as well tolerated as in the beginning. There were no signs of toxic accumulation. Whenever the blood calcium fell below 70 mgm. the symptoms appeared. This drug is expensive but can otherwise be used over a long period of time. Even a return of the blood calcium to normal levels does not signify a cure. It is the calcium metabolism that has to be restored. Cases have been reported in which AT 10 failed to relieve the symptoms and raise the blood calcium level.

EDITH SCHANCHE MOORE

## ANTISEPTIC SURGERY; TREATMENT OF WOUNDS AND INFECTIONS

**Acute Thermal, Chemical, Electrical, and Radiation Injuries.** CHARLES G. NEUMANN. *Surg. Clin. N. America*, 1950, 30: 563.

This complete but concise article deals particularly with thermal injuries, but the author has also summarized the salient features of chemical, electrical, and radiation injuries, especially as the latter are similar or dissimilar to thermal injuries.

The local effects of thermal injury are well known, but it is unfortunately not always recognized that it may be difficult to judge the limits of a third degree burn. Therefore, the surgeon has a responsibility not to excise unnecessarily the tissue which is still viable. Systemic effects of a burn depend chiefly upon three factors: loss of the insulating property of intact skin, transudation of plasma out of the body, and exudation of plasma into the burned tissue. When these factors operate beyond the capacity of the body's reserve, or when severe infection develops, symptoms of the systemic effects of the burn become manifest.

In the emergency treatment of burns a point worth stressing is that "protective" ointments may not be desirable in third degree burns; in fact, wrapping the patient in dry clean towels or sheets after removal of the burned clothing is much to be preferred. For the prevention and treatment of primary shock the most effective agent is morphine sulfate given intravenously. For secondary shock

the important therapeutic measures are the use of pressure dressings on the wounds to help limit the loss of plasma, and the administration of plasma and blood to restore the circulating volume and maintain it. At the time of starting the infusion enough blood should be withdrawn for (1) typing and cross matching, (2) a complete blood count with hematocrit, and (3) the determination of the carbon dioxide combining power, sodium, potassium, chloride, plasma protein, and urea nitrogen levels. These initial values and subsequent determinations should be plotted on a graphic chart.

The author cites various methods of determining the amount of plasma to be given and, when the circulating volume has been restored, the amount of saline solution and glucose required intravenously. With actual destruction of hemoglobin by the injury and with decreased intake of blood-building foods, it may be necessary to give at least one transfusion.

There is great divergence of opinion on the local therapy of the injured area. The author proposes a very sound middle course regarding the preparation of the burned area before the application of dressings and recommends aseptic technique, removal of burned clothing and foreign bodies, washing of the wound and surrounding skin with white soap and water, redraping and gowning, opening thin-walled vesicles, applying pressure dressings of fluff over fine-mesh dry or petrolatum-impregnated gauze. In the absence of signs or symptoms of infection these dressings may be left in place for from 8 to 12 days or even longer. The treatment of infected wounds and the use of antibiotics and tetanus antitoxin are discussed.

Skin grafting must be undertaken at the earliest possible moment. The surgeon should seek to have the skin resurfaced some time during the third week. He should not let the rapid ingrowth of scar tissue epithelium from the edges of the wound obscure the fact that a split-thickness graft to the area would provide a more durable covering and give much faster healing.

The treatment of contractures, the control of pain, systemic supportive therapy, and reconstructive surgery are discussed and properly related to the whole therapy of burns.

BENJAMIN F. LOUNSBURY, M.D.

**The Cat Scratch-Malady** (La maladie des Griffes de Chat). ROBERT DEBRÉ, MAURICE LAMY, M. L. JAMMET, L. COSTIL, and P. MOZZICONACCI. *Sem. hôp. Paris*, 1950, 26: 1895.

Twelve cases of this apparently specific infective process are reported. Such instances have been observed by the authors for approximately the past 20 years. When the Americans were in France in 1947, Lee Fishay of Cincinnati told of observing such cases and suggested a specific extract for intracutaneous use as a diagnostic agent. In the authors' hands, treatment has consisted in diluting the pus from the lesion in 4 parts of physiologic saline solution and after 24 hours at 37 degrees C. the solution is tyndallized at 60 degrees for 2 hours on the first day, and for 1 hour on the second. A thousand units of penicillin per cubic centimeter are added and a control is made of the sterility.

The intracutaneous injection of 1/10 c.c. of this solution resulted in a positive reaction in all of the 12 cases here reported, the reaction appearing within 48 hours in the form of a raised plaque of 6 to 8 mm. in diameter. This lesion was moderately itchy for a few hours and then disappeared without a trace in 2 or 3 days. In one of these cases, however, there developed a wide halo of redness and a papule formed which persisted for 3 weeks. In 2 of these patients the reaction was still positive more than 2 years later, and in 2 others, after more than 4 years. In the case of one of the antigens procured the reactions were excessively severe and this showed the necessity of titrating the antigen before routine use. In 2 of this group, in which the original lesion could be considered the portal of entry, there were signs suggesting more or less reactivation by the test injection.

In all 12 of these cases the specific lesion was an adenitis, either of the cervical or inguinal group of lymph glands. In some instances the adenitis was solitary, while in other cases several lymph glands might be involved, either on the same side or bilaterally. In every patient but 1 (a child treated orally with aureomycin), one or more of the involved glands suppurated and were aspirated or drained through a fistulous tract for a time. The condition was benign on the whole, the enlarged glands returning to normal after a few days or weeks without leaving any visible scar or other skin changes. In 1 of these patients the gland was excised before it could break down, and this specimen, together with the histological examination of some exuberating granulations extruding themselves from a fistula in another patient, forms the basis of our anatomical knowledge of the subject. This histological appearance was that of a nodular formation composed of reticular cells of epithelioid aspect, accompanied by evidence of a central necrotic process. Some of the glands returned to normal with suppuration and in others the broken down tissues appeared to be phagotized by the cells of what the histologist described as germinative centers.

With regard to the etiology, there was always rural residence or rural contacts, and usually a close association with cats. The children in this group frequently showed the scars and other signs of scratch wounds by these animals.

With reference to treatment, aureomycin has seemed to be the only medicament showing any notable successes. JOHN W. BRENNAN, M.D.

## ANESTHESIA

**Anesthesia for Operations about the Head.** ALBERT F. GIGOT. *Surg. Clin. N. America*, 1950, 30: 649.

This article outlines a technique of anesthesia favored by the author for surgical procedures about

the head, with comments concerning the special problems which are inherent in procedures of this type.

The choice of drugs and technique of induction depend on the condition of the patient and the desire of the anesthesiologist. When the patient is sufficiently relaxed under an adequate depth of anesthesia a laryngoscope is inserted for direct vision and an endotracheal tube fitted with an inflatable cuff at the distal end is introduced into the trachea. A preliminary spraying of the pharynx, larynx, and trachea with 10 per cent cocaine will allow intubation in a lighter plane of anesthesia. An adapter and "Y" piece join the proximal end of the tube to the conduits of the gas machine which are extended so that the anesthesiologist may be at some distance from the operative field. The patient is now maintained on ether in oxygen through a circle type of carbon dioxide absorption apparatus.

Anesthesia conducted by this method allows for adequate care of the patient and the prompt management of emergencies without disturbing the course of the surgical procedure.

Should the patient's minute volume decline, adequate ventilation may be affected by intermittent and rhythmic manual compression of the rebreathing bag.

As long as the closed system is maintained the danger of explosion is rather remote. A further precaution is taken by packing the oropharynx firmly with moist gauze strips and then sealing the mouth with adhesive.

Nonexplosive surgically satisfactory anesthesia may be maintained by using nitrous oxide and oxygen in approximately a 2 to 1 ratio supplemented with sodium pentothal.

To facilitate the surgical procedure patients are often placed in the sitting position. Before the patient is placed upright the legs are elevated and wrapped from the toes to the midthigh with elastic bandages. A snug abdominal binder is a useful adjunct. Pooling of the blood in the lower extremities and splanchnic region is minimized.

MARY FRANCES POE, M.D.

**Ouabain as an Adjunct in the Treatment of Shock.** B. B. SANKEY and THOMAS I. CRAWFORD. *Current Res. Anesth.*, 1950, 29: 148.

The author calls attention to the myocardial depression that coexists with general circulatory depression seen in shock and reports on the use of ouabain in the treatment of this condition. In a cardiac emergency this drug is superior to digitalis because of its rapid action, rapid excretion, and precision of dosage. Satisfactory response occurred in 27 of 30 fair to poor risk patients who received between 0.3 and 0.5 mgm. of ouabain intravenously after adequate blood replacement and vasopressor drugs had failed to alleviate the critical condition. A progressive and continued narrowing of the pulse pressure is indicative of reduced efficiency in the work of the heart. If a rapid pulse and a slowed capillary refill time is also noted, such narrowing of the pulse pressure is a warning of impending heart failure.

The use of ouabain is reserved for patients who do not respond well to the usual restorative measures and in whom some degree of myocardial depression is suspected. Toxic effects are due to overdosage. The drug is contraindicated in patients who have received a dose of digitalis within 48 hours.

MARY FRANCES POE, M.D.

# PHYSICOCHEMICAL METHODS IN SURGERY

## ROENTGENOLOGY

**Determination of Physical Factors Influencing the Quality of the Roentgenographic Image. Reproduction Number Method and Its Application.** ARNE NELSON. *Acta radiol.*, Stockh., 1949, Supp. 76.

In this monograph the author presents a new method for determining the various physical factors which influence the quality of a roentgen image. The method is called the "reproduction number method."

The monograph contains eight chapters dealing with the following subjects: introduction, review of the literature, description of the method, experimental design, statistical analysis of the method, application of the method of direct roentgenography, application of the method of fluorography, and conclusions.

Briefly, the method consists in the use of a density scale which is made of plexiglass and has a stepladder arrangement similar to that seen in the penetrometer. Every step of the ladder is provided with holes of gradually increasing diameter. The steps of the basic penetrometer are 0.3, 0.6, 1.2, 2.4, 4.8, and 9.6 mm. in thickness. The diameters of the holes in each step are 0.5, 0.6, 0.75, 1.0, 1.25, 1.65, 2.0, 2.5, 3.1, 3.9, 4.9, 6.2, and 7.8 mm. There are 78 holes altogether. The reproduction of the number of holes on a given roentgen image is the measure of the physical factors influencing its quality, hence the name of "reproduction number method."

The holes are directed toward a point 80 cm. from the center of the plexiglass density scale. which is called the test plate. This distance was chosen since in Sweden it corresponds to the distance between the roentgen tube and the fluoroscopic screen. To eliminate scattered radiation 11 layers of plexiglass of 8 mm. thickness each are placed over the test plate. The density of the test plate plus the plexiglass layers corresponds to that of the human thorax.

Under optimal conditions all the 78 holes can be seen on a roentgenogram of the test plate. If the sharpness of contrast of the image is reduced the number of holes visualized will be less.

The method is very simple. A few exposures are sufficient to determine the optimal value of a single factor and in each image one has only to count the number of the visible holes. The curve thus obtained may be used for the determination of optimal conditions as well as for the comparison of different factors.

The list of factors studied includes (A) for roentgenography: (1) variation in the quantity of radiation, (2) variation in the quality of radiation, (3) different cassettes, (4) different thicknesses of the object, (5) different intensifying screens, (6) the effect of primary diaphragms, (7) the effect of secondary diaphragms, (8) different secondary diaphragms, (9) different sizes of focal spots, (10) different types of films, (11) different developers, (12) variations in time of development, and (13) variations in temperature of development; and (B) for fluorography: (1) different optical systems, (2) the significance of the secondary diaphragm, (3) different types of films, (4) different types of developers, and (5) different sizes of films.

In practice the method is of value (a) in determining the specific factor which influences the quality of the image (roentgen tube, diaphragm, film types, optical systems), (b) in detecting the reason for the change in the quality of the image, and (c) in serving as a continuous control of the standard of the quality of the image. T. LEUCUTIA, M.D.

**Diastematomyelia. Transfixation of the Cord or Cauda Equina with Congenital Anomalies of the Spine.** EDWARD B. D. NEUHAUSER, MARTIN H. WITTENBORG, and KLAUS DEHLINGER. *Radiology*, 1950, 54: 659.

Diastematomyelia or diplomyelia is a congenital anomaly consisting of a sagittal separation of a segment of the spinal cord or cauda equina by a transfixed osseous or fibrocartilaginous septum which is attached to one or several vertebral bodies anteriorly and to the dura posteriorly.

Although Herren and Edwards, in 1940, were able to collect only 42 cases from the literature the condition is not as rare as one would expect. The authors, in reviewing the published reports since then, found 9 other cases and to these they now add 12 cases of their own which have been proved by operation at The Children's Hospital of Boston. In 10 of the 12 cases the diagnosis was made by roentgen examination prior to the operation; 9 patients had a transfixation of the cord and 3, transfixation of the cauda equina.

In the present article the authors discuss in detail the roentgen criteria for the diagnosis of diastematomyelia. In view of the fact that the condition is often associated with other congenital anomalies of the spine, its presence may already be suspected from a study of the routine roentgenograms of the spine. These will show a widening of the neural canal and extension of the interpedicular spaces over several spinal segments with a dividing septum in the center of the widened canal. If the septum consists of bone, it is best visualized in the anteroposterior view, appearing as a small transfixing spicule of approximately 1 to 1.5 cm. in length.

The associated congenital anomalies of the spine include diminution of the anteroposterior diameter of the vertebral bodies, double hemivertebrae, unsegmented or hypoplastic vertebral bodies with narrow intervertebral spaces leading to kyphosis or scoliosis, bizarre vertebral arches with posterior overgrowth, abnormal fusion of the lamina, and spina bifida.

When the osseous spicule is plainly demonstrated on the roentgenogram and is found to occur together with one or several of these anomalies of the spine at or near the same area, myelography may not be necessary to further substantiate the diagnosis. However, if performed, it is not unusual to note that unsuspected fibrous and fibrocartilaginous tissue adds to the bony spicule to produce a wider and longer separation of the cord than originally surmised and that arachnoid adhesions may also be present. In case of a nonosseous septum, myelography is indicated as a routine procedure.

In later childhood and adult life the diagnosis of diastematomyelia becomes considerably more difficult because of the fact that resulting deformities of the spine tend to mask the roentgen findings.

Lesions which come into consideration from the point of view of differential diagnosis are: expanding intraspinal tumors, intraspinal dermoids, lipomas, and meningoceles. The differentiation may prove quite difficult in the cases with nonosseous septa. The authors identified the fibrous septum by myelography in only 1 case, but it is hoped that in the future diagnostic accuracy will be improved.

The treatment is surgical, consisting of removal of the midline septum. A detailed report of the technique will be published elsewhere.

A diagram of the diastematomyelia exposed at operation and the reproductions of 7 roentgenograms are used to illustrate the salient points.

T. LEUCUTIA, M.D.

**Chordomas: A Roentgenologic Study of 16 Cases Previously Unreported.** ERNEST H. WOOD, JR., and GEORGE M. HIMADI. *Radiology*, 1950, 54: 706.

The authors studied the records of 16 patients afflicted with chordoma who were admitted during the last 20 years to the Columbia-Presbyterian Medical Center. In 7 patients the tumor occurred in the clivus, in 1 patient in the nasopharynx, in 5 patients in the vertebrae, and in 3 patients in the sacrococcygeal region.

The case histories of the 16 patients are summarily presented in the form of a table comprising the following pertinent data: age, sex, location, complaint, duration of symptoms, findings of physical examination, treatment, duration of disease, and results of treatment.

As the title indicates, greatest attention is paid to the roentgenologic features of the disease.

In clivus chordomas, osteolysis of various portions of the sphenoid bone was the most conspicuous finding and was usually demonstrated on plain roentgenograms of the skull. In all 7 cases there was destruction of the clivus, dorsum sellae, posterior clinoid process, and sellar floor with neoplastic invasion of the sphenoid sinuses. Extension into the nasopharynx occurred in 2 cases and into the ethmoid sinuses in 1 case. Calcium shadows adjacent to the area of bone destruction were noted in 6 of the 7 cases, and apparently resulted from inclusion of sequestrated bone fragments or degenerative changes in the tumor. Pneumoencephalography and ventriculography which were performed singly or combined in 5 of the 7 cases were of value in disclosing obstruction of the cerebral aqueduct near its junction with the third ventricle. This occurred in 2 cases. In all other cases there was a corresponding displacement of the third ventricle, the aqueduct, the fourth ventricle, and the subarachnoid cisterns whenever these cavities or spaces were outlined by air. The filling defects in the contrast outlines of the basal cisterns were especially distinct.

In chordomas of the vertebral column an involvement of two or more vertebrae with extension of the tumor into the adjacent soft tissues was the outstanding finding, usually demonstrated on routine roentgenograms. In 3 cases there was a diffuse bone destruction leading up to a compression fracture in the final stage; in the 2 other cases osteoblastic reaction dominated the roentgen appearance. Myelography was performed in 2 of 3 cases with pressure on the spinal cord. In both cases complete obstruction of the flow of the opaque medium was found.

In chordomas of the sacrococcygeal region there was marked osteolysis in one or several segments from the upper sacrum to the coccyx in all cases and a roentgenologically visible soft tissue mass adjacent to the destroyed area in 2 of the 3 cases. In each of the tumors calcification or fragmented bone was present.

The treatment of chordoma, either by surgery or radiation therapy, is unsatisfactory, although some prolongation of life may be obtained by both methods. The authors state that 2 of their patients have shown a remarkable response to roentgen therapy. An adult with clivus chordoma has survived without symptoms for more than 9 years following biopsy and therapy with 8,000 roentgens to the tumor, given in 8 series of 1,000 roentgens each dispersed over the entire period of 9 years. In the other case, that of a boy 11 years of age, an almost complete regression of a large nasopharyngeal chordoma was obtained from a tumor dose of 2,300 roentgens. The ultimate prognosis, however, remains poor in all cases. Although, in view of the slow course of the disease, 5 year survivals are not infrequent, in the authors' series the average survival of the 10 patients who died was 3.5 years.

The article is illustrated with roentgenograms showing the typical features in various locations. The essential roentgen findings in the clivus and vertebral chordomas are tabularly arranged.

T. LEUCUTIA, M.D.

**Roentgenographic Changes in Pulmonic Stenosis. A Report of 9 Cases.** R. F. HEALEY, L. DEXTER, M. ELKIN, and M. C. SOSMAN. *Am. J. Roentg.*, 1950, 63: 813.

This is an analysis of 8 mild, uncomplicated cases and 1 severe complicated case of pulmonic stenosis, analyzed roentgenographically and by venous catheterization. Six of these cases demonstrated enlargement of the main pulmonary artery (the local-

ized convexity on the left border of the heart seen immediately below the aortic knob in the posteroanterior projection). Five of these 6 cases demonstrated hyperactivity of the artery on fluoroscopic examination. Enlargement of the left auricle, left ventricle, or the hilar or peripheral branches of the pulmonary artery was absent in all of the simple cases. Over-all cardiac enlargement was present in only 2 cases, and demonstrable right ventricular enlargement in 3 cases. The right auricle was prominent in only 1 patient. The chief finding at catheterization was a higher pressure in the right ventricle than in its main outflow tract.

Differentiation from atrial septal defect, ventricular septal defect, patent ductus arteriosus, Eisenmenger's complex, mitral stenosis, and primary and secondary pulmonary arteriolar obstruction is usually possible, although not absolutely, by the enlargement of the hilar and intrapulmonary branches of the pulmonary artery in these conditions and its absence in simple pulmonic stenosis, even though all of the cases may demonstrate an enlarged main pulmonary artery. In addition, an enlarged left auricle excludes the diagnosis of an uncomplicated pulmonic stenosis. ROBERT L. RAPHAEL, M.D.

**Chest Lesions Often Confused Roentgenographically with Primary Cancer of the Lung.** PAUL C. SWENSON and ROBERT H. LEAMING. *Am. J. Roentg.*, 1950, 63: 629.

The authors make a strong plea for an early investigation of even the minutest chest lesion by all means at our disposal. In view of the fact that carcinoma can mimic almost every other condition encountered within the thorax and, since the incidence of primary carcinoma of the lung is definitely on the increase, the roentgenologist must be careful in attempting to make a dogmatic diagnosis. Neither bronchoscopy nor laboratory examination of the bronchial secretions is unequivocally reliable.

Early exploratory operation is indicated in a number of cases with indeterminate findings, especially when carcinoma is suspected. According to the authors, every cavity in the lung, with or without a fluid level, must be considered as probably being associated with a tumor until proved otherwise. Similarly, every solid mass observed in the chest of a patient over 40 years of age deserves particular attention.

In the present article the authors report a series of 21 cases in which lesions of considerable size were confused with cancer of the lung. Among the inflammatory lesions leading to a possible erroneous diagnosis they list the so-called cholesterol pneumonia recently described by Robbins and Sniffin, lipoid pneumonia which may look like cancer even on the gross specimen, nonspecific granulomas, nonspecific indurative pneumonitis accompanying bronchiectasis, suppurative or organized processes in the pleural space with or without involvement of the adjacent pulmonary parenchyma, and finally nonneoplastic (luetic or tuberculous) bronchostenosis.

The group of benign neoplasms which on the roentgenogram may simulate carcinoma of the lung includes lipoma, neurofibroma, chondroma, simple adenoma, cysts, neurofibroma, multiple adenoma, and pulmonary adenomatosis showing a striking resemblance to an infectious disease of sheep.

Of the miscellaneous lesions, one may mention vascular lesions (infarcts), foreign bodies (broncholiths), and single metastatic lesions.

All 21 cases are illustrated with reproductions of their respective roentgenograms, a significant number of which serve to demonstrate beautifully some of the rarest lesions known to occur within the chest.

T. LEUCUTIA, M.D.

**Tuberculoma of the Diaphragm. Report of 1 Case.** C. L. TU and C. K. HSIEH. *Am. J. Roentg.*, 1950, 63: 822.

A case of tuberculoma of the right hemidiaphragm in a 24 year old Chinese male with chest pain low on the right side of 1 month's duration is reported. In addition to routine roentgenography, kymography and diagnostic pneumoperitoneum were employed in studying the patient. The latter method demonstrated the mass to arise from within the hemidiaphragm and to extend both above and below the diaphragmatic level. The excursion of the hemidiaphragm was limited.

Sixteen other cases of diaphragmatic tumors are listed from the literature covering the period from 1877 to 1941. The cause of the mass in this case was ascertained only on pathologic examination.

ROBERT L. RAPHAEL, M.D.

**Pharmacodynamic Test of the Duodenal Bulb by Oral Administration of Procaine** (La prova farmacodinamica del bulbo duodenale mediante somministrazione per os di procaina). A. OLIVERI and A. ORANGER. *Radiol. med.*, Milano, 1950, 36: 366.

The method used by the authors for pharmacodynamic testing of the duodenal bulb tends to eliminate, by means of local mucosal anesthesia, the abnormal and pathologic functional reflexes of the bulb provoked by simple irritative or inflammatory stimuli of the mucosa or by ulcerative lesions of the mucosa or of the various layers of the wall. In other words, all the indirect definite roentgen symptomatology is ruled out in order to catch more easily the direct signs, or to exclude their presence, and to determine which of the deformities found at the preliminary examination are of functional or of organic nature. For this purpose the authors have used procaine by mouth. A normal roentgen examination of the gastroduodenal tract is first made and the patient is told to go to bed about 10 p.m., and then to ingest 100 c.c. of a 1 per cent solution of procaine in tepid water in a period of 20 minutes while remaining in the right lateral decubitus position. On the following morning the fasting patient takes, in the same manner, 50 c.c. of a 2 per cent solution of procaine, and 2 hours later a roentgen examination is made.

The morning solution is more concentrated to avoid overfilling of the stomach with fluid which might interfere with good visibility. However, in the cases they have examined the authors have never encountered persistence of endogastric fluid, probably because the preliminary anesthesia of the previous evening had caused relaxation of the pyloric hypertonus and, therefore, easier elimination of the fluid given 2 hours before examination.

The patients in whom the method was used may be divided into three principal groups. The first included those with an intolerant, hyperkinetic, and hypertonic bulb without ulcerative organic lesions; the second included those with ulcer of the bulb accompanied by hyperkinetic and hypertonic symptoms; the third included those with organic deformities of the bulb of cicatricial nature due to sequelae of previous ulcers, associated with spastic phenomena.

The procaine method certainly has an antispasmodic, hypokinetic, and, in some cases, anodyne action on the duodenal bulb which is in a phase of marked motor and spastic excitement. The best films are obtained when the motor and spastic changes of the bulb are not based on organic lesions. In case of organic lesions, the direct signs remain clear. It is possible to differentiate the organic from the functional component in bulbar deformities which occur simultaneously with ulcerative lesions or are sequelae of these. The reflex hypertonic and hyperkinetic symptoms of the stomach and the pylorus also disappear under procaine administration.

RICHARD KEMEL, M.D.

**Intramural Small Cystic Diverticulosis of the Gall Bladder.** ÅKE ÅKERLUND and ULF RUDHE. *Acta radiol.*, Stockh., 1950, 33: 147.

The authors describe the roentgen findings which are typical of intramural diverticulosis of the gall bladder. The roentgen findings described consist of a more or less continuous, narrow streak of contrast material immediately adjacent to the gall-bladder shadow and observed for varying distances along its contour. This narrow halo about the gall bladder in such cases is due to the composite effect of contrast filling of a large number of closely packed intramural diverticula. The authors believe that these diverticula, when grossly detectable, are abnormal; however, about 50 per cent of individuals over 30 years of age show microscopic herniations of the mucosa into the underlying layers of the wall. Impaired drainage with increase in pressure within the gall bladder is thought to be a contributing factor to the formation of these diverticula. The authors point out that these diverticula may be detected roentgenographically in cases of "acute pneumocholecystitis" as the diverticula may be outlined with gas.

A review of the cases found in the literature and a new case are presented. The formation and significance of gall-bladder diverticula are discussed.

HENRY C. BLOUNT, JR., M.D.

**Hysterography in Cancer of the Corpus of the Uterus.** OLOF NORMAN. *Acta radiol.*, Stockh., 1950, Supp. 79.

Hysterography has long been practiced. The introduction of iodized oil as a contrast agent caused the method to have a much wider use. The method has been used extensively for studying the passage of the contrast medium through the fallopian tubes in women examined for sterility.

The author presents a series of 128 cases of pathoanatomically verified cases of cancer of the corpus in which hysterography was performed. Altogether 411 hysterographic examinations were made of the 128 patients. Included also were 61 cases of interest from a differential diagnostic point of view which were selected from about 600 hysterographic examinations. The following points were regarded in the planning of this study: diagnosis and differential diagnosis of the roentgen anatomy of cancer of the corpus, and determination by means of hysterography of the site and extent of the cancer with respect especially to classification and hysterographic control of the results of the radium treatment.

The technique consisted of the use of water-soluble contrast media of a diodrast type injected under fluoroscopic control, and the roentgenograms were taken in both frontal and lateral positions. The author attempts to differentiate the types of cancer by taking into account localization of the growth, demarcation against normal mucosa, degree of exophytic growth, and the outline of the tumor, as observed in the roentgenograms. In clinically suspected cancer hysterography proved an excellent method for detecting pathologic changes, also changes other than cancer. In some cases, however, microscopic examination of the curettings was necessary to decide the nature of the changes. Hysterography proved superior to intrauterine instrumental palpation for locating tumors. Hysterography is indicated in cases in which curettage shows nothing pathological in spite of clinical symptoms of cancer.

In the roentgen control examinations during and after treatment, the regression of the changes can be followed. Of 90 cases, 50 could be followed up roentgenologically until no more pathologic changes were discernible. In 36 patients with residual cancer, vaginal adhesions rendered further control impossible. The risks of hysterography in cancer of the corpus were not serious. Hysterovenous reflux without perforation was seen in 5 cases. Complications from mechanical injury were observed in 20 cases. The risk of infectious spread is negligible. No conclusions are drawn as to the possibility of tubal spread in this series because of the shortness of the follow-up.

FRANK L. HUSSEY, M.D.

**Roentgenologic Diagnosis of Urinary Tract Tumors in Infant Children.** MEREDITH F. CAMPBELL. *Radiology*, 1950, 54: 646.

In neoplasms of the upper urinary tract of children the chief interest lies in the identification of Wilms'

tumor. Although excretory urography often suggests the presence of this lesion, a far greater diagnostic accuracy is accomplished by the employment of bilateral retrograde pyelography. New growths of the lower urinary tract are usually recognized by cystoscopy or urethroscopy, but here too urography (cystography, urethrography, urethrocystography) is of definite value.

The preparation of infants and young children for urography is difficult and most frequently unsatisfactory; therefore the author prefers to dispense with it except occasionally, when a low enema is given. The employment of peristalsis-stimulating drugs is definitely contraindicated. In infants a good visualization of the upper urinary tract may be obtained by giving 8 or 10 ounces of milk or formula just before the examination to push the gas-filled intestines downward by the distended stomach.

The author briefly describes a case of duplicated left upper urinary tract with a relatively enormous pyonephrosis of the upper renal pelvis in a girl 2 months old, which was erroneously diagnosed as Wilms' tumor by excretory urography. This error could have been prevented had retrograde pyelography been done. The author performed bilateral retrograde pyelography in many babies less than 1 month of age, the youngest patient with Wilms' tumor being 6 weeks of age. For excretory urography the use of diodrast in somewhat larger doses than usual is recommended in preference to neoiopax since the former produces less venospasm. It is important that in children the urograms be made at shorter intervals than in adults; in infants they must be made at intervals of 2 to 3 minutes since the excretion is very rapid.

The author discusses in considerable detail the urographic changes produced by tumors of the kidney, bladder, prostate, and urethra, using many beautiful roentgenograms for illustration.

In concluding, he states that excretory urography is employed routinely as a "scout" study preliminary to cystoscopic examination, but greater reliance is placed on the cystourethroscopic study and retrograde pyelography. Surgical intervention is undertaken on the basis of the findings of excretory urography only when retrograde pyelography is technically unfeasible. T. LEUCUTIA, M.D.

**The Diagnosis of Renal Tumors in the Adult.** DAVID M. DAVIS. *Radiology*, 1950, 54: 639.

Renal tumors can exist for long periods without causing any symptoms. The only procedure so far recommended in this presymptomatic stage was the Papanicolaou test which demonstrates malignant cells in the urinary sediment; however it was found to be very difficult of general application.

In the symptomatic stage the following signs or symptoms may arouse the suspicion of a renal tumor: hematuria, a palpable mass in the kidney region, pain in the kidney region (although this is an infrequent symptom), the presence of papillomas in the bladder or urethra, tumors elsewhere in the body (especially in the lungs and the left supraclavicular region), indicating metastases, abnormal findings on routine intravenous urography, and demonstration of malignant cells in the urinary sediment.

Once a renal tumor is suspected, retrograde pyeloureterography is indicated. According to the author, intravenous urography represents a complete loss of time and money, and may well be abandoned in the diagnostic investigation of renal tumors.

In performing a retrograde study, it has been the custom of the author for many years to control the position of the catheter and make the injection of the opaque medium under fluoroscopic guidance to assure good filling. If the ureter cannot be properly filled a bulb catheter is substituted to obtain retention of the opaque medium in the ureter.

It is advisable to make stereoscopic roentgenograms with the patient in a moderate Trendelenburg position, as well as films in the right and left 45 degree oblique views, a lateral film, and one in the erect position. More recently Parker also recommended an anteroposterior film with the patient lying on the side opposite to the affected kidney.

Pneumopyelography and perirenal air insufflation are not endorsed in view of the danger of air embolism in both procedures.

It is a good policy to make routinely also a roentgenogram of the chest to rule out possible metastases.

If the findings are inconclusive, the examination may be repeated in 2 weeks, or one may proceed immediately with an exploratory operation.

In concluding, the author states that there must be the closest co-operation between the roentgenologist and the urologist. T. LEUCUTIA, M.D.

**Larsen-Johansson Disease of the Patella. Seven New Case Records. Its Relationship to Other Forms of Osteochondritis. Use of Male Sex Hormones as a New Form of Treatment.** J. WOLF. *Brit.J.Radiol.*, 1950, 23: 335.

Larsen-Johansson's disease of the patella is a rare form of osteochondritis affecting an accessory center of ossification at the lower pole of the patella. It may also involve the adjacent portion of the patella proper.

The common features typical of this disease are its specialized site in the patella, an age incidence between 7 and 14 years, a mixed sex incidence, the occurrence in healthy children, a tendency to be bilateral, and a frequent association with other forms of osteochondritis, especially Osgood-Schlatter's disease.

Larsen-Johansson's disease is usually confused with fracture, tuberculosis, cellulitis, prepatellar bursitis, or acute rheumatic fever. It can sometimes be differentiated clinically. The clinical features in a typical case are a slight limp, difficulty with kneeling, and increased heat with thickening of the soft tissues over the lower part of the knee.

However, the diagnosis of Larsen-Johansson's disease is made roentgenographically. There are

alterations in the regular contour and trabeculation of the inferior pole of the patella, which may be blurred, irregular, or show islands of condensation in a matrix of rarefied bone. As this disease is frequently bilateral, films should be obtained of both knees in doubtful cases. Sometimes the x-ray diagnosis is not easy. Accessory centers at the lower patellar border are rare and may be overlooked roentgenographically. Also, this disease may be present before the accessory center shows up roentgenographically.

Treatment depends on the severity of the disease, and may include doing nothing, bedrest, or immobilization in a cast. The author recommends the addition of testosterone for cases of Larsen-Johansson's disease and for other forms of osteochondritis, as testosterone stimulates epiphyseal growth.

Prior to this article, the total number of cases in the literature was between 25 and 30. The author reports 7 more cases. However, he believes the disease is more common than these figures indicate. He made a deliberate search for this disease by taking roentgenograms of 100 children between 7 and 14 years of age. He found an incidence of 3 per cent which, because of the small series, may be inaccurate. All these cases were without symptoms.

RICHARD V. WILSON, M.D.

**Treatment of Cancer of the Cervix By Radium and Deep X-Rays. Experience at the Rhode Island Hospital, 1933-1943.** GEORGE W. WATERMAN and SUMNER I. RAPHAEL. *N. England J. M.*, 1950, 242: 689.

The authors present an analysis of the 5 year and 10 year absolute and relative salvage rates in a series of 432 cases of carcinoma of the cervix at the Rhode Island Hospital from 1933 through 1943.

A combination of deep roentgen therapy and interstitial administration of radium with long element needles was used. The detailed technique, complications, and the place of deep roentgen therapy have been discussed formerly.

Briefly, the radium treatment consists in the implantation about the cervix and into the advancing zone of the cancer of multiple low intensity platinum-filtered needles which are left *in situ* for a period of 168 hours. A 20 mgm. platinum-filtered capsule is also placed in the cervical canal. Deep roentgen therapy is given to the patients in Stages 1 and 2 (League of Nations classification) 8 weeks after the radium treatment with the objective to cover the lateral parametria and the pelvic side walls. In Stages 3 and 4 deep roentgen therapy is given first to clear up the infection and prepare the ground for the radium.

In the analysis of the end-results 15 cases were omitted as no treatment was given. Of the remaining 417 cases, 140 (34%) were classed as belonging in Stage 1, 208 (50%) in Stage 2, 41 (10%) in Stage 3, and 28 (6%) in Stage 4.

The 5 year relative salvage rate (based on the 417 patients treated) was 70 per cent for Stage 1, 33.2 per cent for Stage 2, 7.3 per cent for Stage 3, and 0 for Stage 4. The composite 5 year relative salvage rate for all stages was 40.7 per cent, whereas the 5 year absolute salvage rate (based on the total of 432 patients) amounted to 39.4 per cent.

The 10 year analysis is based on 229 patients who were seen and treated during the years from 1933 to 1938. Of these, 74 (32%) were in Stage 1, 119 (52%) in Stage 2, 21 (9%) in Stage 3, and 15 (7%) in Stage 4. The respective 5 year and 10 year relative salvage rates were as follows: Stage 1, 66 and 56 per cent; Stage 2, 30 and 25 per cent; Stage 3, 5 per cent and 0; Stage 4, 0 and 0. The composite relative salvage rates of all stages were 36.6 per cent for the 5 year, and 31 per cent for the 10 year period.

The authors call attention to the relatively high percentage of patients in Stages 1 and 2, which indicates that patients present themselves for treatment in a rather favorable condition. This percentage represents the highest value of any of the collaborating clinics in the 1948 Bulletin of The League of Nations Health Organization. An explanation of this may be found in studying the files of the Gynecological Tumor Clinic at the Rhode Island Hospital since its inception in 1922. A steady rise in the incidence of the early cases with a corresponding drop in the incidence of the Stage 4 cases would seem to indicate, according to the authors, that the Clinic has exerted a definite influence on lay and professional education with regard to the early diagnosis of cancer of the female reproductive organs.

The high relative 5 year survival rate of 70 per cent in the cases in Stage 1, comprising 34 per cent of the total group, together with the very low fall in the results between the fifth and tenth year, justify the conclusion that early cancer of the cervix is best treated by radium and deep roentgen therapy.

T. LEUCUTIA, M.D.

## RADIUM

**The Treatment of Disturbances Following Radium Therapy with Desoxycorticosterone** (Il desossicorticosterone nei disturbi da radium-terapia). R. GRATTAROLA and M. BASSI. *Minerva gin.*, Tor., 1950, 2: 188.

The observation that patients with asthenia, apathy, and hypotonia following intensive radium treatment benefit from the administration of suprarenal cortical extract induced the authors to study the biochemical changes produced by desoxycorticosterone. The substance was given patients undergoing radium therapy on account of cancer of the uterus or endometriopathy.

It was noticed that radium treatment was followed by hypoproteinemia, hypotension, increase of the nonprotein nitrogen in the blood, and hyperglycemia.

After the administration of desoxycorticosterone, hyperglycemia and hypoproteinemia were also observed; the increase of nonprotein nitrogen was more marked than in the control cases and the blood pressure showed no changes. The sodium and chlor-

ide contents of the blood likewise remained unchanged. Hypoproteinemia was better tolerated when desoxycorticosterone was administered.

While of the 15 patients in the control group, 7 suffered from asthenia, nausea, vomiting, and diarrhea, only 2 patients in the group of 20 treated with desoxycorticosterone were complaining of asthenia.

JOSEPH K. NARAT, M.D.

## MISCELLANEOUS

**On the Use of Radioactive Substances in Sweden, with Special Reference to Irradiation Risks and Protection Measures.** SVEN BENNER. *Acta radiol.*, Stockh., 1950, 33: 281.

The subject of work with radioactive substances in Sweden is reviewed by the author. Radium therapy must still be considered the most important field of work with radioactive substances in Sweden. The bulk of this work is concentrated in the three central cancer clinics, Radiumhemmet in Stockholm, and the Jubilee Clinics of Sahlgrenska sjukhuset in Gothenburg and of the Hospital of Lund, while about 10 other Swedish hospitals possess radium quantities ranging from 400 mgm. radium down to very small amounts. Among the therapeutic methods used by the three central clinics, teleradium therapy plays an important part. Radiation risks to the personnel have been greatly reduced by remotely controlled units, walls and ceilings of iron ore, concrete, and the placement of teleradium departments in the basement. A contact device for the teleradium unit has been devised to detect slight movements of the patient in relation to the teleradium unit in order to aid the personnel in determining the accuracy of the localization of the treatment and make it unnecessary for the personnel to expose themselves while visually inspecting the teleradium unit. Radium safes, radium work benches, radium transport carts, and radium transport containers have been built to decrease the exposure risk to the radium worker. Other devices and gadgets have been perfected to reduce irradiation to the hands. For radiotherapy other radioactive substances than radium and radon have as yet found only a very limited use in Sweden. As far as is known by the author, radioactive phosphorus has been used more systematically only at 3 hospitals for treating leucemia and other blood diseases. In a few cases, radioactive iodine has been given in thyroid disease. Work on diagnostic uses of radioactive isotopes, e.g., study of the metabolism of different substances or of the blood circulation rate, is being conducted in Sweden on a somewhat larger scale than on their therapeutic uses. No cases of radiation injuries due to the medical use of radioactive isotopes in Sweden are yet known. Scientific work with radioactive substances such as the pure gamma emitters (radium, mesothorium, radiothorium inside of gas-tight filters absorbing all beta radiations, cobalt 60) is being conducted in 11 different institutions with quantities up to 500 mgm. radium. Remote controlled devices and heavy protection walls are the usual aims in the protection of personnel from exposure. In addition to the aforementioned laboratories there is at the Institute of Radiophysics a radon laboratory with a quantity of 1 gm. radium in solution. Scientific work with open radioactive preparations is being carried on in 30 different institutions. At present about 10 Swedish institutions have accelerators such as cyclotrons, betatrons, synchrotrons, and accelerator tubes excited by Van deGraff or cascade generators. The protection problems for the first mentioned phase of accelerator work are in principle the same as in work with strong gamma emitters. Swedish cyclotrons are built in underground rooms separated by a great distance and thick layers of concrete and earth or water from the control rooms and other adjacent premises. For the second phase of accelerator work, the protection problems are similar to those occurring in medical work with radioactive isotopes. In industrial work radiography of heavy iron structures and similar objects is being done with up to a few hundred millicuries of radium and radon. The protection here devised is the use of a long pole for carrying radium and vacating the danger zone during exposures. Another industrial use of radioactive substance is the luminating work in instrument factories. Such work is being carried out in about 15 different establishments in varying amounts. The protection in this is against direct contact and exposure of the worker to the radioactive material. In two factories large quantities of thorium salts are being handled in the manufacture of incandescent mantles.

FRANK L. HUSSEY, M.D.

**Clinicostatistical Report of Carcinoma of the Mouth and Pharynx Treated from 1928 to 1945; Results of Radiotherapy of Carcinoma of the Soft Palate in 84 Cases** (Rendiconto clinico-statistico dei carcinomi della bocca e del faringe trattati dal 1928 al 1945; risultati della radioterapia nei carcinomi del palato molle; 84 casi). ALDO PERUSSIA. *Radiol. med.*, Milano, 1950, 36: 378.

The 84 cases of carcinoma of the mouth and pharynx observed by the author are divided into two groups: forms strictly confined to the soft palate and forms extending from the soft palate to the region of the anterior pillar including the retromalar space. On the basis of these cases, Perussia feels justified in drawing the following conclusions.

The circumscribed marginal forms lend themselves well to radical electrosurgery, which by itself is capable of providing local cure. When the intervention leaves any doubt about its being radical, it is advisable to use radiotherapy immediately in doses similar to those used in cases not operated upon. In all other cases the hope for cure lies in radiotherapy which, however, may be aided by simplification of the field through partial diathermic exeresis.

For radiotherapy of the primary focus there is no reason to abandon intraoral radium (intratissural or with molded apparatus) in the not too extensive

forms and in general in the forms of the first group. Transoral direct roentgen therapy, which might be used in rare special cases (1 case was successfully treated by this method), is always experimental.

In the cases of the second group, especially if the carcinoma is of infiltrating character, uniform irradiation by intraoral radium entails considerable difficulties, and the possibility of using external irradiation should be taken into consideration.

For the treatment of satellite lymph node metastases, surgical intervention is indicated in all cases in which the objective findings are even only suspicious provided that the surgery can be radical. Recourse must always be taken to removal en bloc of all the laterocervical lymph nodes in these cases, even when clinical suspicion attaches only to the submaxillary space. In the absence of contralateral clinical findings, it is best to keep the patient under close observation and to consider intervention as soon as clinical suspicion of involvement arises. In cases in which there is no clinical suspicion of lymph node metastasis, watchful waiting is also to be considered.

In the presence of suspected or evident lymph node metastases that cannot be operated upon or do not lend themselves to radical operation, it is reasonable to apply radiotherapy provided that the limits of radiologic curability have not been exceeded. The author is, however, skeptical about the possibilities of radiology in this field.

Complemental radiotherapy after intervention on satellite lymph nodes has been abandoned as routine practice in the author's institution. It could eventually be reserved as the only possible palliative treatment of patients who could not be operated upon in the typical manner or in whom the operation could not be radical. RICHARD KEMEL, M.D.

**Some Cases of Radiation Injury in Radiologic Work.** SVEN HULTBERG, LARS-ERIC LARSSON, and LENNART EKLUND. *Acta radiol.*, Stockh., 1950, 33: 376.

Knowledge about radiation injuries, their cause, and the radiation dose that caused them is clearly of great importance in radiation protection work. The definite radiation injuries that have come to the notice of the Institute of Radiophysics have been of two kinds: local injuries (chiefly skin injuries) and blood damage. The causes of the local radiation injuries which almost without exception are brought about by faulty working methods, are usually easier to confirm than the causes of blood damage.

Reports on 5 radiation injuries among radiologic workers and 3 among patients undergoing roentgen examinations are given. The cases of injury of the hands of the radiologic workers consist of a nurse who received daily exposure to radiation while holding patients for skull and extremity roentgenograms, a dentist who held the dental films during exposures, an engineer who received an excessive exposure while adjusting an x-ray tube of a roentgen diffraction apparatus, and a nurse who received a skin injury while handling radium needles and plane preparations. One case of blood injury in a nurse employed in a miniature mass radiography omnibus in which the radiation protection was inadequate was listed.

The cases of patients undergoing roentgen examination receiving local skin injuries were due to the patients' receiving excessive radiation during fluoroscopic and film examinations during manipulation and surgical procedures. Because of the cumulative effects of roentgen radiation it is impossible to know, before a perceptible impairment of health has occurred, how many roentgens a person can still absorb without transcending the threshold over which injury is imminent. FRANK L. HUSSEY, M.D.

# MISCELLANEOUS

## CLINICAL ENTITIES—GENERAL PHYSIOLOGICAL CONDITIONS

**Preliminary Observations on the Vascular Channels in Tubed Pedicles.** FENTON BRAITHWAITE. *Brit. J. Plast. Surg.*, 1950, 3: 40.

It is well known that the process of "delaying" a flap enhances its viability. German, Finesilver, and Davis in 1933 investigated the vascular system of tubed pedicles and came to the conclusion that the development of an adequate blood supply appears dependent on three factors: (1) an increase in the number of functioning vessels, (2) an increase in the size of the vessels, and (3) a reorientation of the main vascular channels corresponding to the long axis of the tube.

Roentgenological examination has been the principal method of investigation, microscopic section and macroscopic dissection being used as adjuncts. The larger vessels were visualized by means of injections of pyelosil. The author concludes that the dermal and the subdermal plexuses appear to be the most prominent features of the vascular system of a tubed pedicle. The dermal plexuses, especially, exist in such profusion that they appear to offer a vascular system of low resistance. The venous elements of the subdermal plexus seem to be enlarged in a tubed pedicle. Venous inadequacy would appear to be the primary mechanism involved in the cyanosis of a tubed pedicle. If the resistance to vascular outflow at any point in the tube exceeds the arterial pressure at that point, then cyanosis will occur as a result of the vascular imbalance.

KENNETH E. SHERMAN, M.D.

**Unusually Severe Cushing's Disease, Without Tumor of the Pituitary or Adrenal Gland. Crooke's Lesion** (Maladie de Cushing particulièrement sévère, sans tumeur hypophysaire ni surrénale. Lésion de Crooke). JACQUES DECOURT, A. RUBENS-DUVAL, J. GUILLEMIN, and P. BERTHAUX. *Bull. Soc. méd. hôp. Paris*, 1950, 66: 619.

Most cases of Cushing's disease are caused by tumor of the pituitary gland or adrenal cortex. However, in many typical cases only hyperplasia of the adrenal cortex rather than a tumor is observed. The only finding present in all cases with or without tumor or hyperplasia is the so-called Crooke's lesion. This consists in characteristic changes of the basophil cells of the pituitary gland: hyalinization and vacuolization of the cytoplasm with hypertrophy of the nucleus. The meaning of this phenomenon has not yet been explained. The hypothesis that it signifies increased activity and secretion of adrenocorticotropic hormone is refuted by the fact that Crooke's lesion is present also in cases of primary tumors of the adrenal cortex. The authors report a fatal case in a girl of 22 years who presented all the classical signs and symptoms of Cushing's disease: obesity of the face and trunk, erythrosis, hirsutism, amenorrhea, acne, and increase of the 17-ketosteroids. This condition had developed within the short period of 4 months. During its further course, hypertension, hyperglycemia, and osteoporosis of the vertebrae developed. Treatment, consisting in x-ray therapy of the pituitary gland and extirpation of the left adrenal gland, was unsuccessful. The patient expired 20 months after the onset of symptoms.

The autopsy was essentially negative. Neither tumor nor hyperplasia of the pituitary or adrenal glands was present. The sole histological finding was the presence of Crooke's lesion.

This case is remarkable because it seems to show that typical Cushing's disease may develop on a purely functional basis, without tumor or hyperplasia of either the pituitary gland or the adrenal cortex.

WERNER M. SOLMITZ, M.D.

## GENERAL BACTERIAL, PROTOZOAN, AND PARASITIC INFECTIONS

**Modern Problems in the Realm of Experimentation with Tetanus Toxin** (Moderni problemi nel campo della intossicazione sperimentale da tossina tetanica). MARIO PELLOJA. *Arch. ital. chir.*, 1949, 72: 405.

Guinea pigs were used in this experimental study. In one group of animals, approximately 2 cm. of the femoral and sciatic nerves were excised, in a second group, approximately 2 cm. of the lumbodorsal spinal cord were excised and in a third group the iliac vein and artery were contemporaneously ligated on the side to be injected. The toxin was then injected intravenously and intramuscularly, distal to the site of the ligation or excision.

In the first two of the groups, the general symptoms of the induced tetanus were exactly like those in the control group as regards the time of appearance and the character of manifestations; the phenomena of local tetanus did not develop in the experimental animals. In the third group (ligation cases) the general symptoms were the same; however, they were markedly delayed and attenuated. This led the author to believe that the tetanus toxin is conveyed to the central nervous system by the blood.

Two hundred guinea pigs were then subjected to study in an effort to determine if the toxin could be demonstrated in the blood of the experimental animals. Variable quantities of the toxin were administered (from a few minimal lethal doses to a thousand and more) by the intravenous route and intramuscularly. Then at various periods after the injection (10, 20, 30 minutes, 1 hour, 2 hours) 3 cm. of blood were taken from the heart of the injected animals and reinjected intramuscularly and intravenously into other animals. By this biological

test, which was not too satisfactory, the presence of the toxin in the blood stream of the original animal (when the initial injection had been sufficient), was frequently demonstrable.

In the study of the odd period of incubation in tetanus intoxication, so different from the behavior of strychnine intoxication (wherein the appearance of symptoms will depend more or less upon the point of injection), the author found that the period of incubation in tetanus intoxication remains approximately the same and is always conspicuous for its duration no matter whether the toxin is injected intravenously, intradurally, subcutaneously, or intramuscularly. The only effect demonstrable on the duration of the period of incubation seems to depend upon the amount of toxin injected. This behavior led the author to suggest that a certain concentration in the blood stream is necessary in order to allow toxin molecules (mathematically computable) to combine with an effectual number of nerve cells. He does not believe that the period of incubation depends on a certain length of time necessary for certain chemical transformations of the toxins within the body of the experimental animals to render their intoxicating properties sufficiently elevated.

In the symptomatology of local tetanus it seems that we must assign importance to the peripheral conditions. The author's studies on nerve interruption (including interruptions of the spinal cord), novocainization, and the administration of curare and of myanesine seem to show that the contractures and the delay in decontraction of the muscles locally are not of central origin. These contractures present many resemblances to those of rigor mortis and are ascribed to action of the toxin on the muscle fibers independently of the nerve supply. The author does not think that they can be explained on the basis of a greater sensibility of the muscle to acetylcholine and inhibition of the cholinesterase.

In the tetanized subject a notable diminution of the content of cytoplasmatic nucleoproteins exists in the cells of the anterior horn of the spinal cord, which suggests a heightened functional activity in this structure. The author does not, however, suggest that this finding is a pathognomonic sign of tetanus, as stated by Hyden (Symposia, *Soc. Exper. Biol., No. 1, Nucleic Acid*, Cambridge, 1947).

JOHN W. BRENNAN, M.D.

## DUCTLESS GLANDS

**Postmenopausal Basedow Syndrome Cured by the Estrogens: Changes Observed in the Extracellular Fluids** (Syndrome basedowien post-ménopausique guéri par les oestrogènes). R. CACHERA, M. LAMOTTE, and N. MASSE. *Ann. endocr.*, Par., 1950, 10: 548.

The authors report the case of a woman of 62 years who reached her menopause 13 years previously and in the past 6 months developed a Basedow syndrome which presented certain clinical peculiarities suggesting hypothalamohypophyseal participation (transitory insipid polyuria, strongly edematous exophthalmos, and the absence of apparent thyroid hyperplasia). The volume of extracellular fluid was increased as in the ordinary forms of hyperthyroidism. Complete cure was obtained in 6 months by the administration of estradiol and dienestrol.

The role played by the anterior hypophysis in these hyperthyroidisms of the menopause has been invoked up till now for physiopathologic and therapeutic reasons; in the present case the peculiar symptoms themselves called attention to the hypophysis. However, the most interesting facts were revealed by the study of the extracellular fluids before and after treatment. It must be remembered that (1) hyperthyroidism generally causes a notable increase in the volume of the extracellular fluids, demonstrated by the distribution area of thiocyanate; (2) the suppression of the hyperthyroidism is accompanied by marked decrease of the extracellular fluids, which return to normal or even somewhat below normal as soon as the basal metabolism becomes normal; (3) the sexual sterols, especially estradiol, have a marked hydrating activity in experimental cases.

Before treatment in the present case, the volume of the extracellular fluids was definitely increased: it represented 24.8 per cent of the body weight, while the normal figure is 21 per cent. This interstitial increase of fluids was exteriorized by voluminous palpebral edema and slight edema of the lower extremities. The only treatment given consisted of a series of 28 intramuscular injections of 5 mgm. of estradiol benzoate and 3 series of 20 daily treatments with 15 mgm. of dienestrol. This massive treatment caused, for 5 months, uterine bleeding which had the appearance and periodicity of menstruation. However, it also caused a gradual decrease in the extracellular fluids. During the first 3 months of treatment the volume of the fluids decreased from 14.250 to 12.180 cgm., a fact that was all the more remarkable since there was a simultaneous increase in weight of 4,400 gm. which reduced the percentage of extracellular fluids in relation to the body weight to 19.7 per cent, i.e., below normal. The plasma volume followed the same evolution; it decreased from 6.5 per cent of the weight to 5.3 per cent, or close to normal. Seven months later and 4 months after suspension of the treatment, the patient was well and without any trace of edema. Thus, the hydrating effects proper to estrogen were overcome by its therapeutic action on the Basedow syndrome. RICHARD KEMEL, M.D.

## EXPERIMENTAL SURGERY

**Experimental and Clinical Studies of Reduced Temperatures in Injury and Repair in Man. The Effect of Cold on Vascular Elements of Human Skin.** HAMILTON BAXTER and MARTIN A. ENTIN. *Plastic & Reconstr. Surg.*, 1950, 5: 193.

The presentation by these authors is a sequel to the wider investigation of the pathogenesis of

cold. The authors studied the sequelae of changes due to injury by cold under controlled conditions in man with special emphasis on the changes in the vascular elements.

The effects of three levels of temperature were studied: namely, 65 to 50 degrees F. or 18 degrees C., 32 degrees F. or O degrees C., and minus 108 degrees F., or minus 78 degrees C. The reaction of normal intact skin, traumatized skin, and of pedicles was observed clinically and histologically.

The authors observed that in the mild and moderately severe temperatures (65 to 32 degrees F.) a hyperemia followed restoration to room temperature in all tissues, but it persisted longer in the recently healed donor sites, and the extravasation of red blood cells and the degree of inflammatory reaction was greater. They found that there was no satisfactory method for direct measurement of the smaller vessels but that the greatest dilatation of vessels following exposure to a moderately severe temperature occurred in the capillaries and venules at about 16 to 24 hours after the return to room temperature. They found that the reaction to cold in laboratory animals was different from that in man and they expressed caution with regard to transposing conclusions obtained in laboratory animals to conditions and reactions in man.

From these studies, it appeared that increased permeability following prolonged exposure to moderate cold was due to direct damage of the smaller vessels, and that the local ischemia of the tissue was due to further embarrassment of local circulation, hyperemia, and persistent lymphatic stasis. Early administration of heparin is believed to assist lymphatic circulation by way of preventing coagulation in the tissues and thereby reducing fibrosis.

The effect of actual freezing of human tissue was studied by means of contact with solid carbon dioxide, minus 108 degrees F. The method was applied to intact skin and to tube pedicles constructed to simulate digits or extremities. The sequelae of injury by freezing are severe and involve the cells of all tissues by direct damage. The edema that follows restoration of frozen tissue to normal temperature is due to the massive escape of intravascular fluid from the smaller vessels and leads to an arrest of circulation because the solid columns of red blood cells cannot circulate.

The administration of anticoagulants cannot repair injury of the vascular tree caused by freezing, a fact which has been borne out by many investigators. The main problem in the clinical management of frozen tissue is to discover some method of retaining the fluid elements of blood within the damaged cells. Anticoagulants may help to maintain the circulation in the adjacent, only slightly injured, areas.

Recent investigations have not borne out earlier enthusiasm regarding the efficacy of anticoagulant substances in the clinical management of frozen tissues.

JOHN E. KARABIN, M.D.